A Database Publication

# THE MICRO USER

Volume 7
Number 3
May 1989
£1.50

Top-selling guide to the BBC Micro, Master, Archimedes and Z88

## SLOW BOX

An easy-to-build speed controller

## CARD INDEX

A simple, effective database listing

## SOUNDEX

How to trap those neerley ryte spelings

## DICE

Chance and challange combined in Yahtzee

## EDUCATION

Have fun learning to spot the odd one out

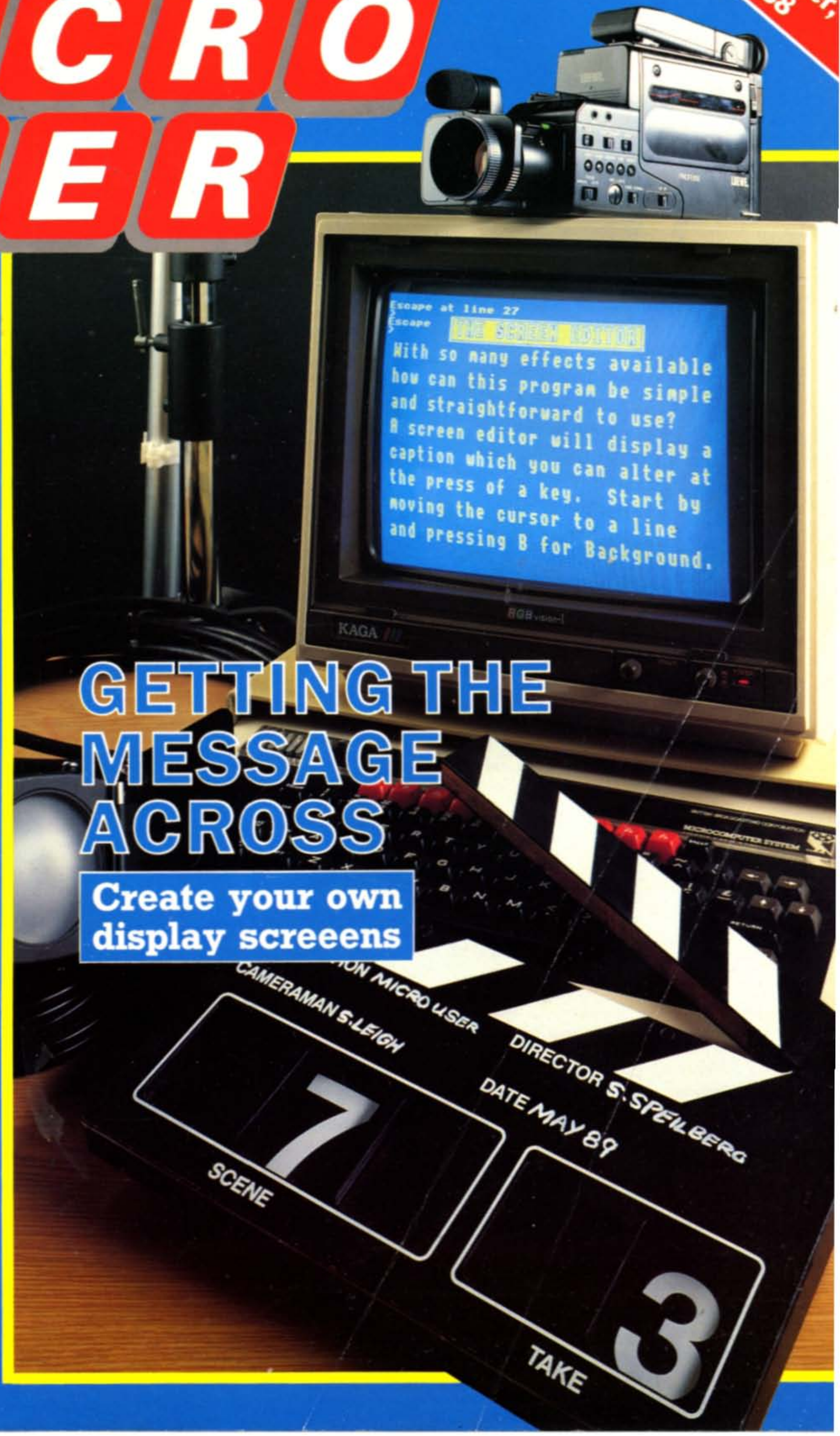
## Z88

Follow me: A memory testing type-in game

## REVIEWS

- Flying Start II
- Worst Witch
- Mapventure
- Numerator

. . . plus all the latest games



```
Escape at line 27
Escape
THE SCREEN EDITOR
With so many effects available
how can this program be simple
and straightforward to use?
A screen editor will display a
caption which you can alter at
the press of a key.  Start by
moving the cursor to a line
and pressing B for Background.
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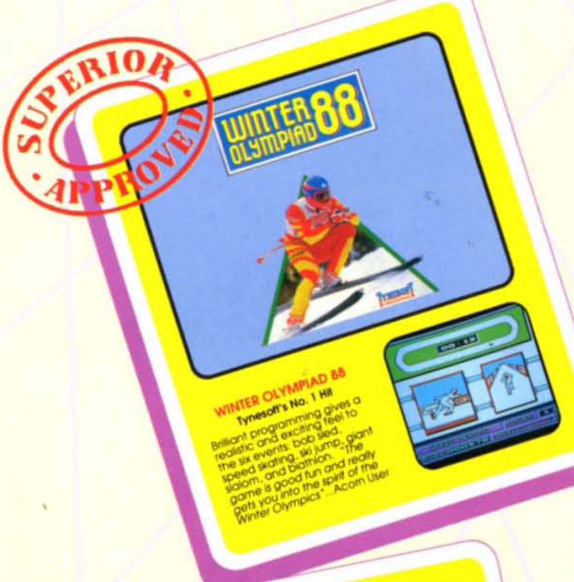
KAGA
RGB vision-I
ON MICRO USER
CAMERAMAN S.LEIGH
DIRECTOR S.SPEILBERG
DATE MAY 89
7
SCENE
3
TAKE

## GETTING THE MESSAGE ACROSS

Create your own display screeens

# PLAY IT AGAIN SAM 8



**WINTER OLYMPIAD 88**
**Tynesoft's No. 1 Hit**
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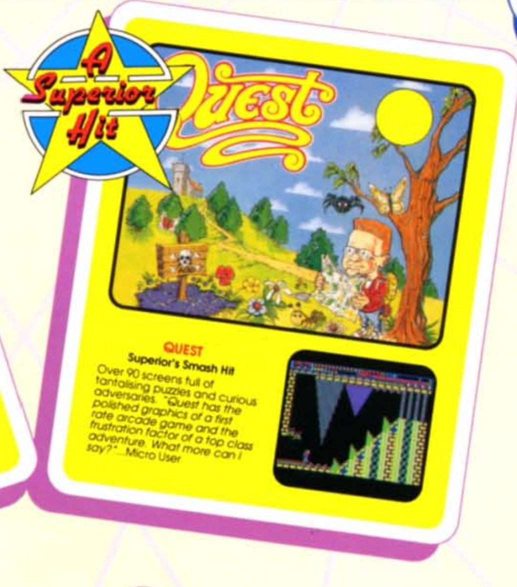
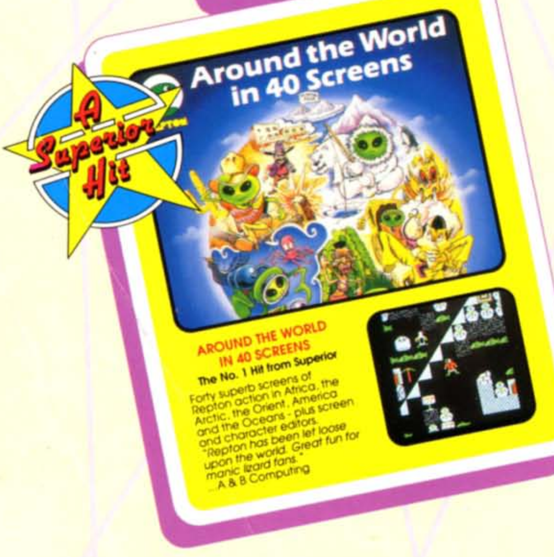


**QUEST**
**Superior's Smash Hit**
Over 90 screens full of tantalising puzzles and curious adversaries. "Quest has the polished graphics of a first rate arcade game and the frustration factor of a top class adventure. What more can I say?" ...Micro User


A Superior Hit
Around the World in 40 Screens

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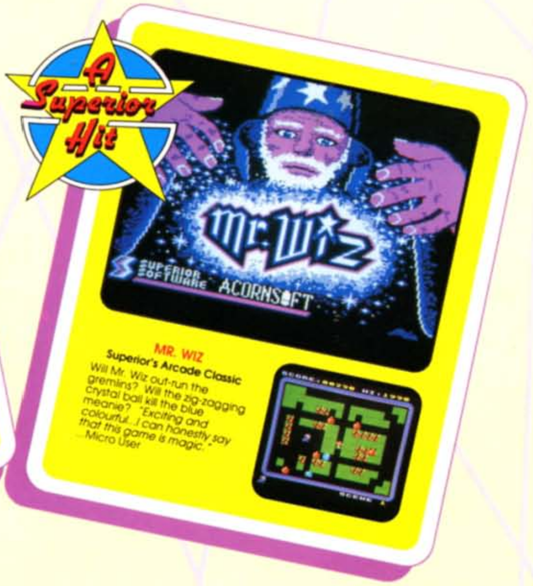

**MR. WIZ**
**Superior's Arcade Classic**
Will Mr. Wiz out-run the gremlins? Will the zig-zagging crystal ball kill the blue meanie? "Exciting and colourful...I can honestly say that this game is magic." ...Micro User

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(The screen pictures show the BBC Micro versions of the games.)

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The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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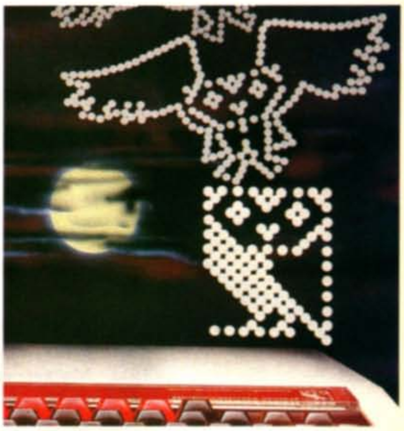

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YOU HAVE FAILED
IT NOW FALLS TO OTHER HEROES TO CHAMPION THE EARTH THIS DAY

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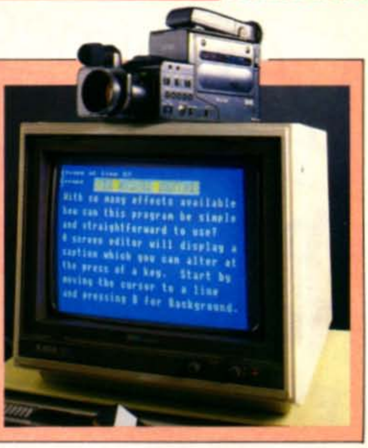
## *Cover story*

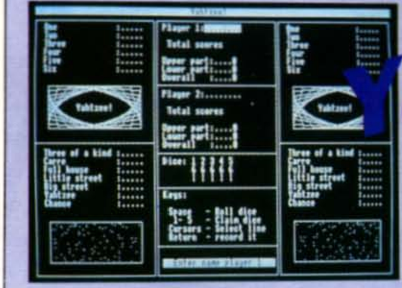
## IN THE PICTURE

**Speed up the producing professional text displays for home-video captions – or even a lecture – using this excellent utility with a wide variety of striking text displays. Turn to Page 20.**



With so many effects available how can this program be simple and straightforward to use? A screen editor will display a caption which you can alter at the press of a key. Start by moving the cursor to a line and pressing B for Background.

**Having trouble keeping up with super-fast arcade games on your BBC Micro? On Page 27 we'll show you how to build a simple unit that will slow any program.**



Yahtzee!
One
Two
Three
Four
Five
Six
Player 1:
Total scores
Upper part
Lower part
Overall
Player 2:
Dice:
Keys:
Space - Roll dice
1-5 - Claim dice
Cursors - Select line
Return - record it
Three of a kind
Carre
Full house
Little street
Big street
Yahtzee
Chance
Enter name player 1

## Yahtzee!

**Strategy games from the Orient are always popular and Yahtzee is no exception – play it with a friend and the aid of your BBC Micro. The listing starts on Page 89.**

## MICRO USER CLASSIFIEDS

The best bargains in the world of the BBC Micro come from fellow readers of *The Micro User*. Turn to ***Page 122*** to find just what you're looking for – from cheap modems to complete computer systems.

**For full details of how to use the Checksums, see the article on Page 48 of the February 1989 issue of *The Micro User*.**

**The Type-it-in symbol indicates that the feature contains at least one full length listing for you to key in on your micro.**

## NEXT MONTH

**SPACING**
***Printing proportionally***

**5-ALIVE**
***Great BBC Micro game***

**GRAPHICS**
***Emulate the Archimedes***

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***Graphic demonstration***

THE MICRO USER

**June issue on sale May 3**

Archimedes

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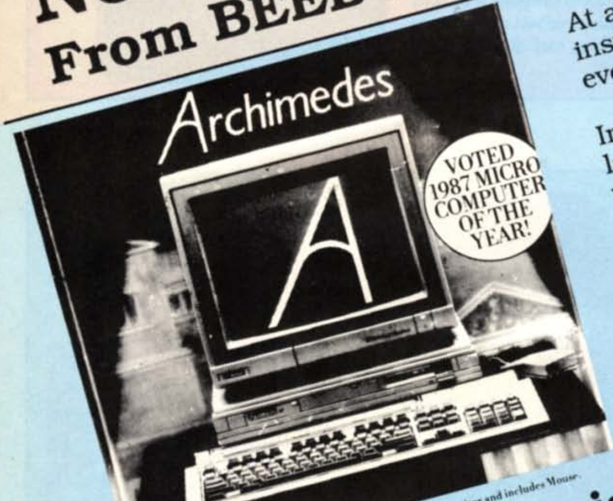
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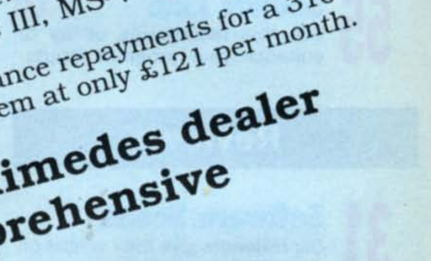
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# NEWS beat

## Acorn ARMing for market battle

AN emphatic vote of confidence in ARM technology came from Acorn managing director Harvey Coleman in an exclusive interview with *The Micro User*.

Although Acorn intends making the jump to 64 bit machines in years to come, its immediate target is one of consolidation within its present field.

"We certainly want to expand our technology within our own existing markets", he said. "We are continuing to develop and enhance ARM technology and even if other outlets should arise that would tempt us to new technology, it will still be ARM related.

"It provides facilities that no one else can offer. It is better on price and performance than any other Risc chip in the world. There are lots of ways it can be used and we will be concentrating on utilising it in workstation environments.

"Other people such as Sanyo and VLSI will be producing derivatives and we should start to see the impact of these in the course of this year".

Acorn is currently working towards on-board memory caching. "That is obviously going to help matters and we will see processes improving", said Mr Coleman. "We do run our chips at a ridiculously low clock speed and a lot of opportunities are open within the technology to enhance performance.

"The whole chip set is constantly under the eye but we believe that processor improvements must be matched by the chip set.

"We have gained some tremendous advantages by having matched chip sets and Risc OS fully takes advantage of this. Risc OS and Unix have both turned out to be very good and one of the reasons we have such sparkling performance is because we match the chip set to its operating environment.

*Harvey Coleman: "We are continuing to develop and enhance ARM technology"*

"On board cache can be incorporated into the processor chip. We will have that chip technology in the course of this year. It will be seen in the machines sometime next year. What is important about this is that the basic ARM is the same as we have today. It is 100 per cent compatible".

Just over a year into his directorship of the previously ailing Acorn, Mr Coleman was cautiously optimistic about the company's financial future.

On the Archimedes front, he scotched rumours that a new low spec machine could be on the way.

"We have an excellent specification with the Archimedes", he said. "If we did anything we would improve this, not reduce it.

"If we want to make improvements, we have lots of scope to do it between the 310 and the 440. We intend to do this to fill out the range. Having achieved performance that we believe is outstanding, we would not want to go back on the specification.

"There are 520 applications now available or under development on the Archimedes. Shortly there will be nearly 700 and by the end of the year it will be 1,000. This should give people a degree of confidence because many of these applications are unachievable with any other machine".

## Micro program is contest winner

MALCOLM Girling of Cambridge believes in capitalising on his work. After developing his new problem-solving software Mind-Breaker, he used it to enter four competitions, won three of them and netted more than £5,000 in prizes.

He was the first ever winner of The Times Tournament of the Mind and claims his software is the first package available to crack mind-bending puzzles on a BBC Micro.

"Logic, diagramatic, verbal, mathematical and miscellaneous puzzles are catered for and most can be solved in seconds", says Malcolm who has also used Mind-Breaker to achieve the title Mind of the Year 1988.

Included with the software is The Times Tournament of the Mind book containing 250 puzzles with answers to check the micro's accuracy. Mind-Breaker comes on two single sided 40 or 80 track 5.25in discs for £25.

Malcolm, who lives at 32c George Pateman Court, Tenison Road, Cambridge, says he especially welcomes orders from the visually impaired.

## THE WAY AHEAD FOR DTP

THE prestigious Desktop Publishing Show organised by Database Exhibitions will take on a new look this year with Presentations '89, a unique "show within a show", highlighting the art of professional presentation.

It will be held at the London Arena in the city's fast developing docklands area from October 4 to 6.

PIRA, the UK's leading independent advisory service, will combine with a team of recognised authorities to run a series of seminars covering the full range of communication skills.

Database Exhibitions' managing director Michael Meakin said: "The new professionals in computer graphics and the more traditionally based audio-visual specialists both have much to offer the marketplace individually, and even more to offer when they can come together in a single forum.

"Converging technologies is the way forward, and this is what Presentations '89 is all about".

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| 0903B EMR Sound Synthesiser | 41.26 |
| 0904B EMR Creations Disc | 16.48 |
| 0948C EMR Studio 24 | 81.78 |
| 0905E Logotron Logo | 57.00 |
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| 0911B AutoSketch | 75.62 |
| 0914B Lingenuity Presenter | 24.65 |
| 0938C ABC - Basic Compiler | 82.57 |

## BOOKS (No.VAT)

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| 1211B Arch. Assembly Lang. | 14.20 |
| 1243C Arch. Operating System | 14.20 |

## CLARES

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| 1098C Alpha Base | 39.10 |
| 1094B Sound & Graphics Demo | 9.50 |
| 1079B Arc Buffer Module | 16.48 |
| 1078B Render Bender | 66.04 |

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| | |
|---|---|
| 0947C Home Accounts | 41.26 |
| 0931C Sigmasheet | 57.78 |
| 0932C Gammaplot | 57.78 |
| 0920C Deltabase | 24.74 |
| 0921C System Delta Plus | 57.78 |
| 1233C Sys. Delta Plus Ref. Man. | 24.74 |
| 0922C Order Processing* | 53.65 |
| 0923C Sales Ledger* | 53.65 |
| 0924C Stock Manager* | 53.65 |
| 0925C Purchase Ledger* | 53.65 |
| 0926C Nominal Ledger* | 53.65 |
| 0927C School Administrator* | 66.04 |
| 0928C Video Rental* | 57.70 |
| 0929C Reporter* | 20.61 |
| 0939C Mailshot* | 33.00 |

* Requires System Delta Plus

## BEEBUGSOFT

| | |
|---|---|
| 0100C Masterfile ADFS | 14.35 |
| 0101D Hearsay | 45.00 |
| 0102B Archimedes DFS Reader | 8.61 |

## OTHER HARDWARE

| | |
|---|---|
| 0805D CC ROM Podule | 46.55 |
| 0806B Battery Backup for above | 9.50 |
| 0803B Armadillo Sound Sampler | 104.50 |
| 0825C IEEE488 Podule | 269.71 |
| 0802C Chromalock Podule | 280.25 |
| 0808C Watford Video Digitiser | 236.55 |

## ARCHIMEDES UPGRADES

| | |
|---|---|
| 0234B Econet Board (as M128) | 40.37 |
| 0266C 0.5Mb RAM (305 only) | 141.55 |
| 0267G Floppy Disc Drive | 118.75 |
| 0268G 20Mb Hard Disc (300's) * | 474.05 |

*It is recommended that the Hard Disc is fitted by a dealer. This is a FREE service, please contact us for details.*

| | |
|---|---|
| 0269C Podule Backplane | 37.05 |
| 0270D ROM Podule * | 56.05 |
| 0271D I/O Podule * | 80.75 |
| 0272D MIDI add-on to I/O | 37.05 |
| 0273D MIDI Podule * | 65.55 |

* Requires Podule Backplane

## ARCHIMEDES LEADS

| | |
|---|---|
| 0832B Keyboard Extension Lead | 6.91 |
| 0558B SKART Lead | 7.78 |
| 0425C Archimedes Printer Lead | 7.78 |
| 0795C 5.25" Disc Drive Buffer II | 28.91 |
| 0796C Serial Link Kit & Disc | 15.00 |
| 0797B Just Serial Link Cable | 10.00 |
| 0828B Arch. Audio Lead | 5.17 |

## ARCHIMEDES GAMES

| | |
|---|---|
| 0952B Corruption | 20.61 |
| 0950B Quaser | 9.87 |
| 1122B Repton 3 | 16.48 |
| 0945B Terramex | 16.48 |
| 0946B Pacmania | 16.48 |
| 0935B Dread Dragon Droom (ed.) | 15.65 |
| 0949B Word Up Word Down | 14.83 |
| 0944B Fish | 20.64 |

## ARCHIMEDES ACCESSORIES

| | |
|---|---|
| 0794B Arc. Spiral Bound Keystrip | 2.57 |
| 0789B Blue Beebug Mouse Mat | 3.04 |
| 0788B Red Beebug Mouse Mat | 3.04 |
| 0716B Archimedes Dust Cover | 7.43 |

## Please add 15% VAT and then carriage

Carriage is denoted by the letter contained in the stock code. A-60p, B-£1, C-£2, D-£3, E-£4, G-£7. When ordering several items, use the highest price code and half of each subsequent code. For courier delivery use code G.

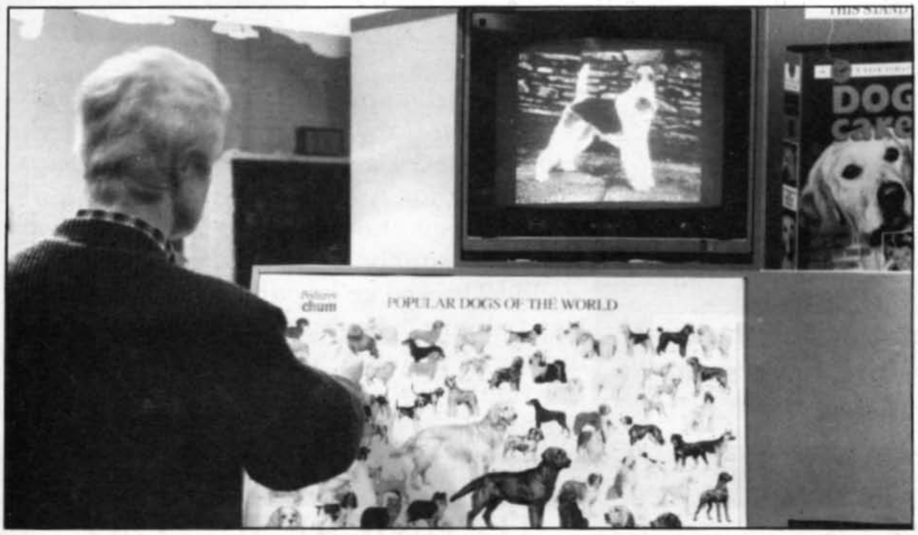
**Credit Cards** VISA

Access and Visa orders are welcome, and may be placed by letter or telephone (24 hours).

## *PRICES EXCLUDE VAT*

**Prices shown are BEEBUG or RISC USER members prices only. To join, simply send £14.50 for a years subscription, which will entitle you to quality technical support, user group magazines & up-to-date information on new products mailed to you ten times a year, and competitive prices on all items of stock.**

***Our non-members prices are normally at least 5% higher.***


Pedigree chum
POPULAR DOGS OF THE WORLD
DOG care

# Archimedes shines at Cruft's

ALL creatures great and small are being computerised. First it was dogs, then cats, now birds. Crystal Presentations (021-666 7018) has developed a system called Popular Dogs of the World providing instant canine tips using the Archimedes.

Five Archimedes were connected to a selection board on the Pedigree Petfoods stand at this year's Cruft's Dog Show. Visitors pressed their choice of dog on a touch sensitive illustrated poster showing 70 breeds.

This gave them a colour monitor picture of the dog and a printout of information ranging from historic origins to grooming tips.

Crystal has since produced a similar system covering over 80 breeds of cat. It was used for a top cat show at Crystal Palace.

Initially, the systems were designed for use on exhibition or display stands and also for interactive classroom learning, but Crystal and Pedigree have plans for keyboard-operated programs.

Jonathan Barnes of Watford has written a program for birdwatchers which he has placed in public domain.

Birdlog is a database for the Archimedes and designed to hold a full year's records, updated day by day. The public domain program may be copied and used by anyone but Jonathan requests that regular users either join or make a small contribution to Greenpeace.

The program is available for £5.99 from distributor David Pilling, PO Box 22, Thornton Cleveleys, Blackpool, FY5 1R.

Minerva Software (0392 437756) also looks set to serve the animal kingdom. The company has received inquiries from a top cat breeder who is interested in using its Archimedes package Ancestry to keep records of her feline aristocats and dignified pictures of them.

## Chip design course

*GATE Array Design Teaching System from Silicon Vision (01-422 2274) provides an introductory course for teaching silicon chip design with facilities for array and cell design, on-line help and a tutorial on integrated circuit design.*

*It has been produced to allow students and engineers to gain hands-on experience of using a CAD package for gate-array design. Available for 8 bit BBC Micros or Archimedes, it costs £89.95.*

*Silicon has also brought out Film-Maker for producing animated sequences of 3D scenes with dynamic camera motion providing walk-throughs and flight paths for objects within a scene. It costs £79.95.*

## Bargains

IT'S all systems go at Software Bargains (0532 697531). A regular advertiser in *The Micro User*, the company has met with such demand that prospective customers have been requested to ring for a catalogue to keep up with the latest stock items and prices.

This demand was particularly high in March, but a look at the latest catalogue will advise customers of changes in stocks and prices since then.

## IN SHORT...

*DATAVID is a new range of PAL encoders aimed at providing high quality micro graphics for video makers. For use on the Master and Archimedes, it comes from Interactive Media Resources (0902 25444) and costs £179.99.*

★ ★ ★

LATEST from Ace Computing (0223 322559) is Mogul, a film-making add-on to Euclid, the 3D graphics package for the Archimedes.

With Mogul, scenes created in Euclid are brought to life when replayed at high speed in an animated cartoon sequence. It costs £20 to all registered Euclid users.

★ ★ ★

*CDS Software (0302 321134) has re-released Brian Clough's Football Fortunes hoping to boost existing sales of 80,000 well over the 100,000 target. BBC Micro tape costs £7.99, disc £9.99.*

★ ★ ★

INTELLIGENT Interfaces (0789 415875) has announced a new expansion card for the Archimedes. It provides two additional RS423 serial interfaces with data formats and baud rates that can be independently programmed. Price £227.

★ ★ ★

*FIREBIRD (01-631 5206) has released BBC Micro and Archimedes versions of the new sports simulation game 3D Pool. BBC Micro version costs £8.99, Archimedes disc £19.99.*

# BEEBUG

## Your Chance To Join The Team

In 1982 when Acorn announced the release of the BBC Micro, Beebug was formed to provide a magazine and user group for the new computer. Since then Beebug has continued to grow and provide new services.

Today, as well as publishing Beebug for users of the BBC Micro, Master and Compact, we publish RISC User, the leading magazine exclusively for Archimedes users. We also have a large showroom and Mail Order operation, supplying goods throughout the world all backed up by our Technical Support Department. Beebugsoft, our software division, provide an exciting range of products for the BBC, Master and Archimedes.

**We are shortly expanding into larger premises and therefore have some interesting staff vacancies.**

### ENGINEER
### Full Time & Freelance

A full time engineer is now needed to enable us to improve our repair and upgrade services. In addition to this, the successful applicant will be involved in the design and development of new hardware projects for the Archimedes, and subsequent new machines that Acorn will be releasing. We also require the services of freelance engineers to work on design and development projects from their own homes.

### TECHNICAL SUPPORT ASSISTANT

Our Technical Support team provide answers and advice on an extremely wide range of subjects, covering both software and hardware on the BBC Micro, Master and Archimedes computers. We are looking for someone who owns a computer themselves and can demonstrate their enthusiasm on the subject. Training will be given, although a certain level of knowledge concerning existing products will be necessary along with the ability to express yourself clearly in writing and on the telephone. Experience on PC compatibles would also be a benefit.

### SOFTWARE PROJECT CO-ORDINATOR

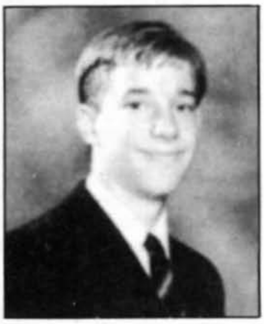
This is a new and particularly interesting position for someone who has an eye for fine details. Reporting to the software manager, the successful applicant will have the opportunity to control new software projects for the Archimedes. This is not a programming position, but knowledge of Basic and Assembler is essential (and C preferable) together with familiarity of popular applications software. The ability to write clearly will also be necessary to produce program specifications and user documentation.

If any of these positions are of interest and you would like to work in a friendly but demanding company, please apply in confidence giving full details of yourself and any relevant experience.

**Personnel Manager,**
**Beebug Limited,**
**Dolphin Place, Holywell**
**Hill, St. Albans, Herts.**
**AL1 1EX**

# NEWS beat

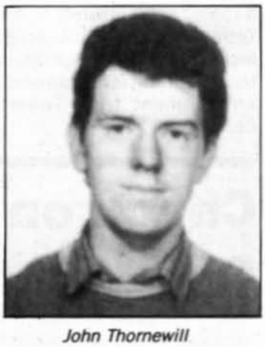
## Aiming for the top



*William Scales*

*TEENAGERS John Thornewill and William Scales have been working since early 1987 to produce the ultimate game for the BBC Micro. They now believe they have done it with the arcade adventure Infinity.*

*It centres round a crash landing on Infinity, fourth planet of the Inferium system, and the fight for survival there.*



*John Thornewill*

*BBC Micro and Master disc versions cost £14.99. BBC tape version, £9.99.*

## Ceefax Guide

WE apologise to our readers but, due to circumstances beyond our control, we have been unable to publish the guide to what will appear on Ceefax during April.

## Business to business link

DUNCAN Baker derived such benefit from the ExpertLink service on MicroLink that he has now taken over the day-to-day running of that category, upgraded under the new name of BusinessLink.

He sees the service as a business club where members can benefit from mutual ideas and experience backed by a reinforced team of experts.

With his wife, Duncan runs Lydbury English Centre specialising in residential courses in English as a foreign language for overseas business and professional people.

"I see the business to business category to be of particular value to smaller companies such as ourselves", he said. "It is an ideal forum in which to bring services or products to the attention of other MicroLink users.

"We made contact with three of our best overseas agents through the old ExpertLink and I hope this sort of exchange and contact will continue at a higher level on BusinessLink".

Duncan would welcome any suggestions and advice for BusinessLink. He can be contacted directly on MAG232 or via the board by keying >BU.

● *How to join MicroLink: See Page 8.*

## *Micro User to rescue*

*THE Micro User* has played a vital part in a life saving computer training aid achieving national recognition.

In February 1987 we featured the BBC Micro program called Emergency First Aid from consultant anaesthetist Dr Peter Burridge of Rochdale. It was part of the national Save a Life campaign aimed at teaching everyone in the country what to do in a life or death emergency.

The program has now been officially adopted by the British Red Cross Society and will be included in a resource pack which, for the first time, recognises the role of teachers in getting across its message.

"This development is all thanks to the original Save a Life campaign and the article in *The Micro User* because without that we would not have got the idea across", said Dr Burridge. "Through publicity in *The Micro User*, we reached thousands of people and hundreds of them bought discs.

"Even now, two years later, people are still coming on to us wanting to buy the disc and mentioning that original article. It was by far the most important piece of publicity for this disc which has been instrumental in changing the attitudes of the British Red Cross Society in recognising the part teachers have to play".

THE MICRO USER
Top-selling guide to the BBC Micro
Viglen hard disc reviewed
SAVE A LIFE

Following publicity for the program, Dr Burridge produced more than 500 discs, acquired his Screen Teach company and sold licenses to education authorities.

With the end of the Save a Life campaign, its responsibilities were handed over to voluntary aid societies including St John Ambulance, the Red Cross Society and in Scotland, the St. Andrews Ambulance service.

The Red Cross saw the value of computer training and in April decided to promote a CPR (Cardio Pulmonary Rescusitation) pack for teachers to use.

"We are talking about the real sharp end. The dire emergency stuff when someone acting positively can save a life in the 10 minutes it takes for an ambulance to arrive", said Dr Burridge.

The teaching pack will be aimed at 13 and 14-year-olds and will be ready for the start of the autumn term this year. It will include motivation material to show pupils what is expected, an instructional video, worksheets, posters, an instruction book, slides for overhead projection and a disc that will test what each pupil has learned.

Teachers will be advised to seek advice from the Red Cross or from doctors who were originally involved in Save a Life. It is hoped to set the cost of the resource pack well below the £50 mark.

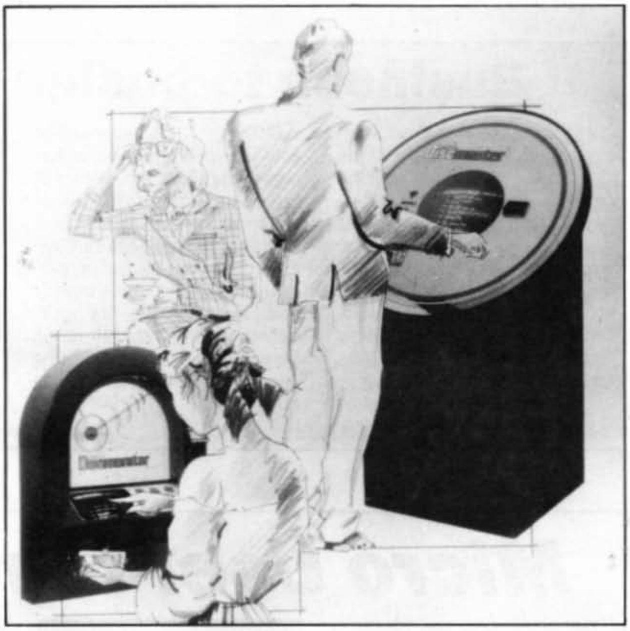
# NEWS beat

## Master controls the beat

*THE world's first computerised CD jukebox relies on an Acorn micro to keep its music playing. Providing useful feedback on the popularity of songs, it has also opened up the possibility of national jukebox charts.*

*Arbiter Leisure's new jukebox, called Discmaster, is already in more than 1,000 pubs and clubs throughout the UK. With longer licensing hours, its entertainment is no longer restricted to the Top Twenty but gives access to 1,000 different selections through a touch-sensitive computerised scrolling system.*

*The Acorn Master board at the heart of each system makes this jukebox more versatile and allows weekly printouts of album and track selections.*



## MURDER IN THE SHADES

SHADES, the MicroLink online adventure, was the host to mass murder on the evening of March 4 as a Wizard went on the rampage attacking and killing mortals – those who have not yet reached Wizard status – at random, without apparent motive.

Everything was moving nicely on the regular Saturday night quiz game when suddenly the competitors started getting booted off. With shouts of: "What's happening?" and: "Someone's attacking me!" ringing in the air, the nightmare unfolded throughout the rest of Shades.

Not knowing who was responsible, the Wizards scanned all the games warily. The culprit, so it would seem, had disappeared.

The quiz resumed for a minute or two, when it was interrupted again, by screams of agony. It was at this precise moment, that the person responsible revealed himself through a message that Poledra the Mystical had been killed by Ford the black magic Wizard.

Now all hell was let loose, as Ford went from game to game, magically summoning mortals out of the safe area – only Wizards can do this – and slaughtering them on the spot. Wizards have incredible fighting strength, leaving mortals little chance.

The quiz was terminated, and the other Wizards online teamed up, constantly chucking Ford off the system. However, even their powers are limited, and he kept coming back to continue his trail of carnage.

Within five minutes, most of the mortals had gone, fleeing for their lives. Shades was deserted, except for Wizards frantically looking for an Archwizard to purge the game of this character. The stench of death lingered, as Ford disappeared once again.

Although MicroLink Shades was safe for the time being, Prestel Shades was not to be denied its fair share of mayhem. Ford set about the high level mortals on that system too. With Wizards frantically chasing the villain, the very foundations of Shades shook.

Suddenly Ambushbug the Archwizard appeared in a rage so great that even the gods quivered. Without mercy he blotted this maniac from the game forever.

Then he set about treating the wounds – putting things right by returning people's scores to their original value.

Gradually people came back on to see the aftermath of this holocaust. Even now there is no explanation as to why it all happened. Never in the history of Shades has anything like this been seen. Indeed, Ford will be remembered for many a long time, as the Immortal who went berserk, and brought Shades to a standstill.

## New adventure

AVON, the Shakespearean adventure game from Topologika (0733 244682) is now available on the BBC Micro and Master 128 for £14.95.

## Q-Office into Unix

AIMING at commerce, education and research markets, Quadratron Systems (01-371 5755) has now ported Q-Office, its office automation system into Acorn's new range of Unix workstations.

The sales and marketing director for Q-Office, Bill Billinness said: "We see this as a strategic move, building links between us and Britain's leading micro manufacturer. We will have access to Acorn's Unix network and dealers and will benefit by association from the company's use of new Risc technology".

Among other software applications for the R140 are relational database management system Informix, modular business accountancy suite Tetraplan, MPD's 4GL Sculptor including SQL and Sea Change, the application generating environment from Thomson Computers.

## Check on software

THE new Archimedes R140 workstation is being supported by a validation suite developed at GST Professional Services in Cambridge. Acorn see the suite as a major component of the software quality assurance exercise for the R140.

Called UKVS (Unix Kernel Validation Suite), it carries out software checks on the operation of the Unix system. Each time the machine software is amended or updated the complete package is checked by Acorn's quality control specialists using UKVS.

# JOIN
# BEEBUG or RISC USER
## *and let us help you with your*
## BBC MICRO, MASTER or ARCHIMEDES

## How do members benefit?

Access to a wide range of quality programs, all free to members.
Free, unlimited advice from our Technical Support team in selecting hardware and software to suit your needs, and help with any technical problems.
5% discount (or more) on hardware and software purchased through our shop or speedy mail-order service.
Interest free and low-cost credit schemes for larger purchases.
Good selection of re-conditioned BBC micros, Masters and Archimedes computers.
And best of all, a regular magazine.

## Which group should I join?

If it's the BBC Micro (Model B, B+, Master or Compact) which interests you, then BEEBUG with seven years experience of supporting such machines is the group for you.
If it's the Archimedes that you use, or are considering, then RISC User is the group to join.
Both User groups benefit from their own regular magazines, published 10 times per year, and packed with impartial reviews, programs, and articles for all readers. All back issues are kept in stock, and the wealth of information and programs which they contain provides a valuable resource to help you make the most of your micro.

## BEEBUG MAGAZINE

Recent issues have included:
● File Handling ● Centres of Gravity ● 3D Landscapes ● FS and ADFS Utilities ● Computer Aided Design ● Page Composition ● Real-Time CLock ● Game Strategy
Regular features covering 512 co-processor, education, communications, news, letters, hints, reviews, workshops, beginners' series, etc.

BEEBUG
FOR THE BBC MICRO & MASTER SERIES
Beebug ICON Designer
Centres of Gravity
PRINT FORMATTING
INTEGRA-B REVIEW
DESIGNING ICONS
USING A MOUSE
USING SPREADSHEETS
KNIGHT'S TOUR
KEYBOARDS
UTILITY

## RISC USER MAGAZINE

Examples of the contents of recent issues:
● RISC OS ● Graphics ● Animation ● WIMP Manager ● Disc Menu ● ARM Assembler ● Mouse Menu ● Reviews of ProArtisan ● ABC Basic Compiler ● Studio 24 ● Real Time Solids Modeller ● RiscFORTH ● Pipedream Spellcheck ● plus news, comments, hints and more

RISC USER
Fractal Scen
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THE MAGAZINE AND SUPPORT GROUP EXCLUSIVELY FOR USERS OF THE ARCHIMEDES

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### Ages 2-5

- Alphabet
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- House
- Magic Garden
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- Pelican
- Seaside
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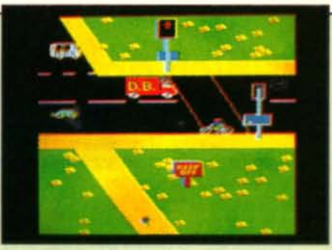
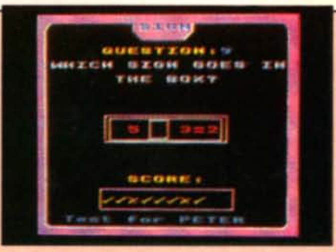


PELICAN
*Teach your children to cross the road safely at a Pelican crossing*

### Ages 5-8

- Balance
- Castle
- Derrick
- Fred's Words
- Hilo
- Maths Test
- Mouser
- Number Signs
- Seawall
- Super Spell



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*Provide the correct arithmetic sign and aim to score ten out of ten*

- Use your Electron to teach and amuse your children at the same time.
- Three packages crammed full of educational programs – and so easy to use!
- Each program has been educationally approved after extensive testing in the classroom.

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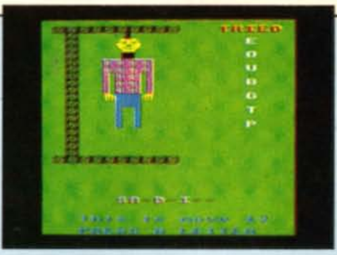
OUR PRICE
£9.95

### Ages 8-12

- Anagram
- Codebreaker
- Dog Duck Corn
- Guessing
- Hangman
- Maths Hike
- Nim
- Odd Man Out
- Pelmanism
- Towers of Hanoi



HANGMAN
*Improve your child's spelling with this fun version of the popular game*

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This delightful collection of programs is based around children's favourite Nursery Rhymes. There's plenty of sparkling colour, sound and captivating animation to keep them riveted – and as they play they'll be learning all the way.

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- ★ Match the animals in See Saw Marjory Daw.
- ★ Play an exciting game in Hey Diddle Diddle.

Type the word now!
Went

What's the time?

**TO ORDER PLEASE USE THE FORM ON PAGE 135**

# TECHNOMATIC

Techno House, 468 Church Lane, London NW9 8TQ. Tel: 01-205 9558 Fax: 01-205 0190
305 Edgware Road, London W2. Tel: 01-723 0233 Telex: 922800

## ARCHIMEDES, BBC COMPUTERS & ECONET REFERRAL CENTRE

## Archimedes

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We can now offer 12 months extended credit payable in 12 easy instalments at finance charges well below current bank rate (typical APR 19.8%) as shown below:

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|---|---|---|
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| **440 Colour System** | £247 | £247 |
| **440 + Taxan 770+** | £279 | £279 |

Above prices are *inclusive* of VAT charges · Carriage £8/base computer, £12/system

These prices are typical examples of our offer. We can provide similar terms for a system to suit your requirements. Application for the finance arrangements is simple and can be completed in two days. Phone for details.

You can pay by cash/cheque/Access/Visa to order Archimedes systems at the following prices:

| | Base | Colour |
|---|---|---|
| **Arc 310** | £695(a) | £885 (2×a) |
| **Arc 440** | £2049(a) | £2239 (2×a) |
| **Arc 440 + Taxan 770 +** | | £2489 (2×a) |

All 440 systems include Software Developers Tool Box at the extra cost.
For PC Emulator add £50 to above prices.

## New RISC OS

The multi tasking operating system for the Archimedes **RISC OS** will be available next year. ***We are able to offer you an introductory price of £29(c) whilst our initial stocks last.*** Order your set now and be sure of being one of the first recipients of this OS at the concessionary price. Use VISA/ACCESS to order and you will not be charged until we actually despatch the package to you. You can redeem part of the voucher value to pay for the RISC OS.

## BBC MASTER

We include free Educational/Fun Bundled software from BBC Publications range (RRP £40) and a STARdataBASE package worth another £40

**BBC Master AMB15** **£356(a)**

## WINCHESTER DRIVES

TECHNOMATIC Winchester range covers drives from 20Mb to 70Mb capacity and are available in various combinations with floppy drives and tape streamers for use with BBC computers.

The Winchester Drives are supplied formatted and are ready to connect to the computer fitted with an appropriate disc filing system.

For the Master users we supply a front end utility which displays the total contents of the drive in icon format and enables you to load any file from there.

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Our software range for Archimedes and all BBC models includes: Language, Productivity, Applications and Educational packages.

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The most comprehensive CAD system for the Master. Host of innovative featurs for creating complex drawings, pcb layouts, sketches etc. Virtually no restrictions on drawing sizes. On screen scaling for plotters, variety of screen dumps for compatible printers

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**evaluation disc available on request.** The disc contains operating instructions and will perform as release version except for file functions.

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For details on rest of our range please ask

## ECONET ACCESSORIES

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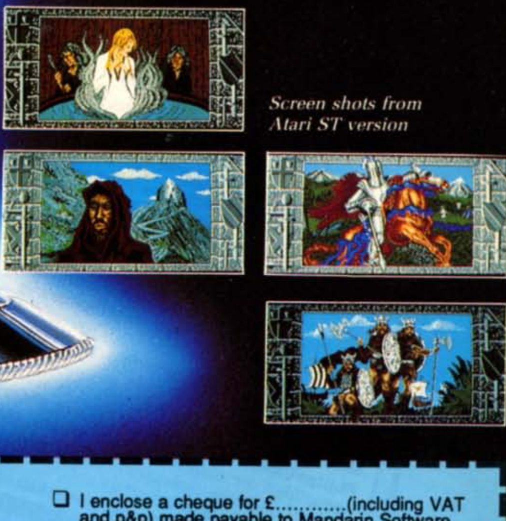

*Screen shots from Atari ST version*

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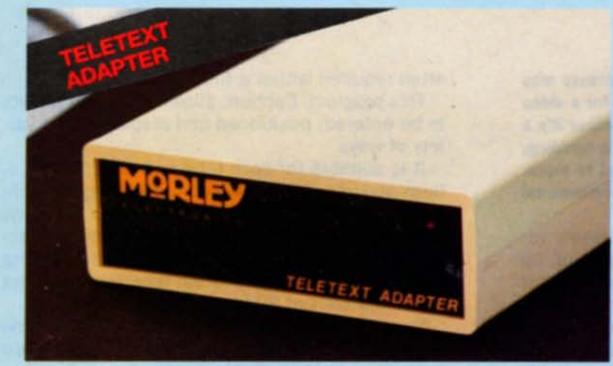

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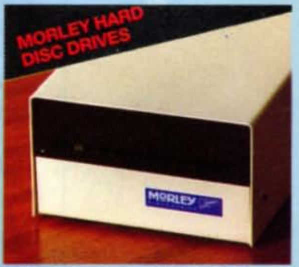

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# The professional touch

John Dewar shows how to give your home videos some high tech titles

**THERE must be many BBC Micro owners who have been asked to produce titles for a video tape at some time or another. Whether it's a school concert, a birthday party, a wedding, or just some cine films transferred to video. And, hopefully, good titles will add that professional look.**

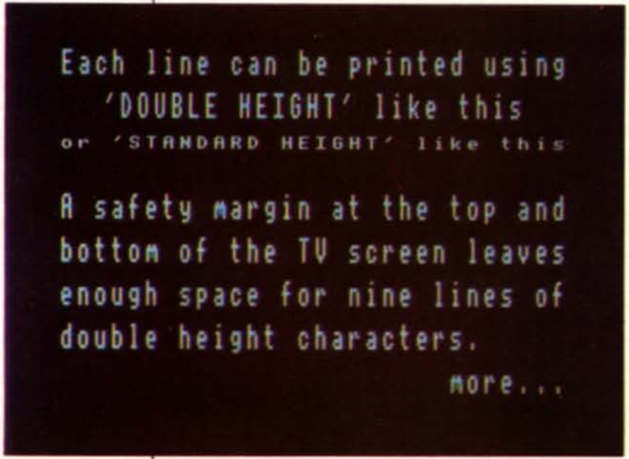
Television uses three main techniques for titles: There are rollers where the credits roll up from the bottom of the screen and disappear off the top and crawlers where text appears on the bottom right of the screen, moves across to the left and disappears. Finally there are captions which consist of stationary information suitably positioned. Rollers and crawlers are very impressive but they only work well if you are presenting a long list of credits. Captions are ideal for most home videos, not only for titles and credits but also for the various headings that are often required within a film.

This program, Caption, allows titles and credits to be entered, positioned and displayed in a variety of ways.

It is suitable for both tape and disc filing systems and uses Mode 4 which provides reasonable graphics without eating up too much memory. Twenty captions are available and all the characters are well spaced to prevent them merging when recorded on the popular tape formats – but there is a limit of 30 characters to a line.

Various effects are available, including double height text, edged characters, reversed backgrounds and variable display times. Text can be left justified or centred and each caption has a maximum of nine lines – enough to fill the screen when using double height characters.

Type in the Caption and ensure that it is correct using Get it Right! It uses two menus which are described in detail below. On running it you will be presented with the first menu and to create your first caption you should select the editor which helps you to add a caption and position it on the screen. Having entered each caption all that remains is to set the delay time and return to menu one. You can now display your finished sequence of captions or save them for later use.



```
Each line can be printed using
  'DOUBLE HEIGHT' like this
or 'STANDARD HEIGHT' like this

A safety margin at the top and
bottom of the TV screen leaves
enough space for nine lines of
double height characters.
                        more...
```

Ideal for video titling

## Menu I options

- Option one is used for loading an existing file. If there is a set of captions already in memory, confirmation is required before the load operation can continue.
- Option two gives access to the editor which provides all the facilities for creating captions.
- Option three is used to run your programmed sequence of captions:
  - ☐ Enter the number of captions to be displayed.
  - ☐ A bleep will sound at one second intervals.
  - ☐ Press the spacebar to run the display sequence.
  - ☐ At the end of the sequence the screen clears and a bleep sounds as before.
  - ☐ Press the spacebar to return to the menu.

The blank screens give you time to start and stop a video recorder and the bleeps help with the timing of run-ups and so on.

- Option four is used to save a set of captions. If the filename given already exists, confirmation is required before it can be overwritten.
- Option five can be used for any of the normal operating system commands but do not use it for compacting a disc or any of the other commands that use main memory.
- Option six is the only way to exit from the program apart from pressing Break. If a set of captions exists you will be asked to confirm that you really do want to quit the program.

## Menu II options – the Editor

- Option one is used as a text editor when creating and editing captions. The top of the screen shows the caption number with nine lines of 30 spaces displayed in reversed video below. Using the arrow keys text can be entered anywhere you choose.

A command line at the bottom of the screen will remind you of the active keys which are used like this:

**Shift+Right/Left arrow** moves the cursor five places.

**Control+Left arrow** deletes text to start of line.

**Control+Right arrow** deletes text to the end of line.

**Control+Up arrow** will erase the current line, move the following lines up and the last line is filled with spaces.

**Control+Down arrow** will insert a line. All lines from the cursor position are pushed down and the last line is lost.

**Copy** will restore a line with its original text.

**Return** moves the cursor to the start of the next line.

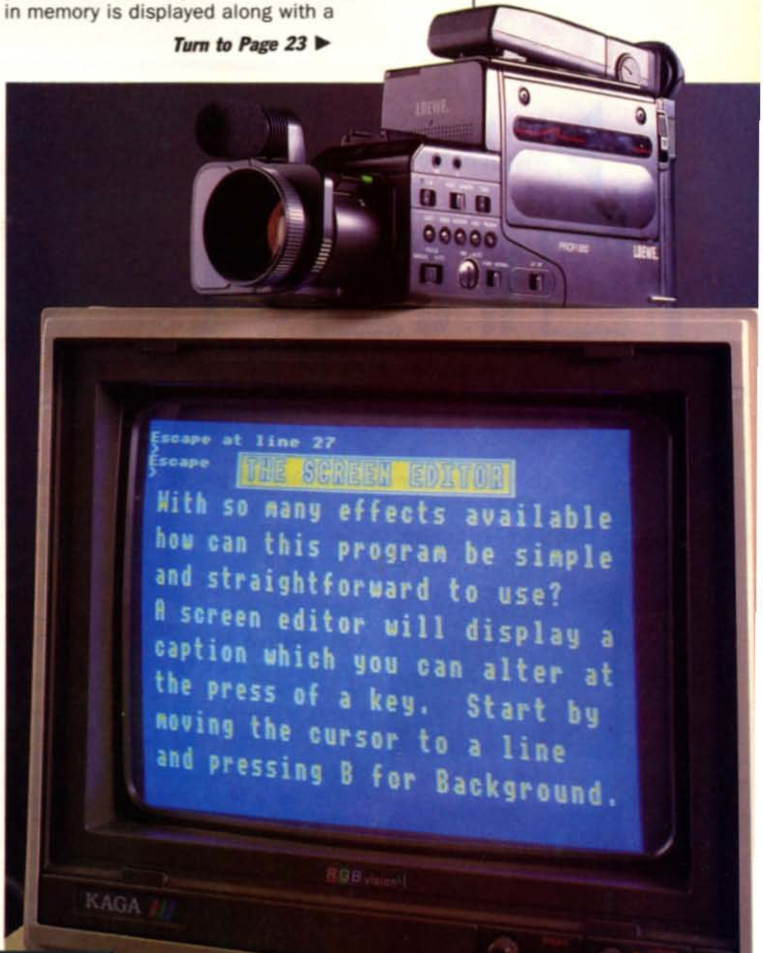
When you have finished entering text, move the cursor to the last line and press Return. At this point you can decide to continue editing, move to the next caption, or exit.

Captions often follow the same format, with only slight variations between them. For this reason each new one will appear as an exact copy of the preceding one, including the positioning and appearance of the lines.

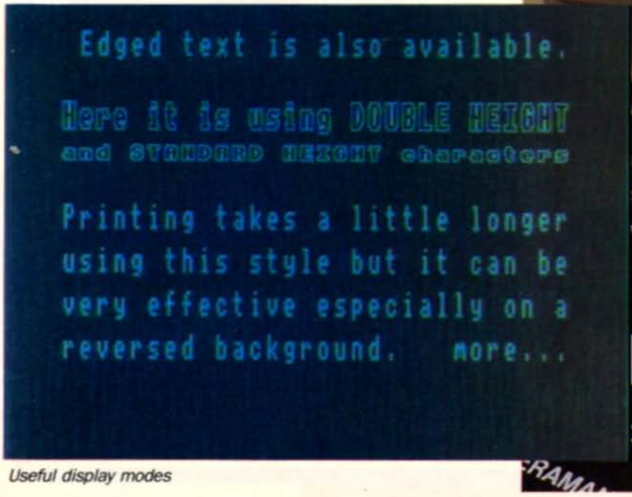
This often makes alterations easy to carry out, since typing is kept to a minimum. It also results in fewer spelling mistakes. Finally, blank captions are ignored, but duplicate ones are assumed to have been created for good reason.

- Option two presents each caption in turn and asks if it should be erased. Be careful – confirmation is not required.
- Option three is used for inserting a caption. New ones are inserted before the existing one. There is a slight delay while they are shuffled up, and after that you will be presented with the edit screen.
- Option four allows you to edit a caption. Each is presented in turn and you are asked if it should be modified.
- Option five is a screen editor which you can use to experiment with the style and screen position of each caption. The first one in memory is displayed along with a

Turn to Page 23 ▶



```
Escape at line 27
>
Escape   THE SCREEN EDITOR
>
With so many effects available
how can this program be simple
and straightforward to use?
A screen editor will display a
caption which you can alter at
the press of a key.  Start by
moving the cursor to a line
and pressing B for Background.
```



```
Edged text is also available.

Here it is using DOUBLE HEIGHT
and STANDARD HEIGHT characters

Printing takes a little longer
using this style but it can be
very effective especially on a
reversed background.    more...
```

*Useful display modes*

# CLARES ARCADE GAMES

Some real classics from Clares, "Arcade 3" and "Overload". Pit your wits against Mega Monsters, defeat Deadly Invasions, push your playing powers to the limit.

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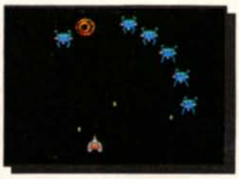
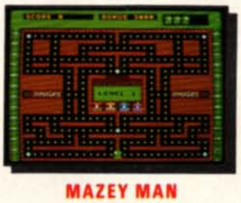


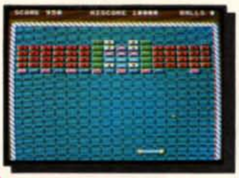
**ZARKON INVASION**

And here's a hungry little game, Mazey Man. He's feeling peckish but so are the guards, it's eat or be eaten in this gastronomic maze game.



**MAZEY MAN**

Bounce-A-Ball's fun, that is if you're not a brick. Because bricks get broken in this colourful and complex game, smash the colourful bricks, but can you be as quick as the ball?



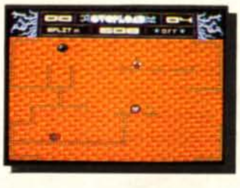
**BOUNCE • A • BALL**

Arcade Three, three tests of skill and ingenuity from Clares.

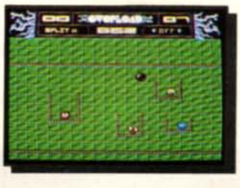
## OVERLOAD
### THE MEGA MONSTER EXPERIENCE

It's a mega-monster experience. Why? Well it's all Igor's fault you see. He created a whole host of video nasties after booby trapping Frank 'n' Stein's interstellar cell phone.

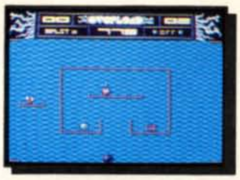
As a fitting reward for this dastardly deed, Igor is sentenced to life imprisonment in a spheroid. But spheroids being the dull places they are, drive Igor to suicide, and the trouble is, the nasties are still on the loose.



Here's where you come in, you are Cheetah, Igor's 11 legged flea. Your job, sort out those evil slime balls! It's not as easy as it looks, however, Frank 'n' Stein's set up a little sabotage of his own and the nasties must now die in the correct order.



And if that isn't bad enough, there's a time limit too. Squash the nasties in the wrong order or exceed the time limit and you could end up... well, it's just too horrible to write about.



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◀ From Page 21

command line to remind you of the active keys which toggle various effects:

**B**: Display the current line using reversed background.

**D**: Display characters on current line in double height.

**E**: Display the current line using edged characters.

**C**: Centre all captions on screen or print left justified.

**G**: Display all captions using same format as caption one.

**H**: Hide all captions until fully printed on the screen.

**J**: Jump to another caption.

**S**: Strip leading and trailing spaces from each line on all captions – vital if lines are to be centred properly.

**Up/Down arrow**: Move cursor from one line to another.

**Shift+Up/Down**: Move the whole caption up/down screen.

**Return**: Exit to menu two.

● Option six displays your captions in any one of the available non-flashing colours. Press the spacebar to cycle through the colours and press Return to exit to menu two.

● Option seven is used to set the presentation time per caption. This can also be controlled manually by entering a delay of zero seconds and then each caption will remain on the screen until the spacebar is pressed.

● Option eight exits from menu two back to menu one.

How you transfer your captions on to tape will depend on the type of equipment you have available. For best results you should connect a suitable lead between the video output socket at the back of the micro – which may not give a colour signal – and the video input on the video recorder. If your VCR has a manual switch to turn it to video input don't forget to select it.

If your video doesn't have video input at all – or you don't have the lead – just use a normal UHF lead and tune a spare channel on your recorder to the incoming signal from the micro.

## DATA STORAGE

*The text for each caption is held in a two dimensional string array. Line data, however, is held in a byte array and uses one byte to store all the effects used on a given line like this:*

| Bit | Meaning if set |
|---|---|
| 7 | Use edged text |
| 6 | Reverse background |
| 5 | Double height |
| 0..4 | Position on screen |

## MAIN VARIABLES

| | |
|---|---|
| **Cen** | Centre all captions if TRUE |
| **Glo** | Global |
| **Hid** | Hide caption until fully printed if TRUE |
| **Str** | Strip leading and trailing spaces if TRUE |
| **BOX** | Fill in the background if TRUE |
| **CTR** | Centre current line if TRUE |
| **DBL** | Print text using double height if TRUE |
| **A$** | Main string variable |
| **B$** | Secondary string variable |
| **C$** | Character code for double height |
| **C$(#,#)** | Array for each of the captions |
| **MT$** | An empty string of 30 spaces |
| **YN$** | Used for yes/no answers |
| **A%** | Used for OSBYTE calls |
| **X%** | Register value for OSCLI calls |
| **Y%** | Register value for OSCLI calls |
| **AW** | Actual colour of logical white |
| **C** | Chosen option from menu |
| **CODE** | Memory location for double height m/code |
| **Del** | Display time for captions |
| **G** | General variable |
| **J** | Main loop counter |
| **K** | Secondary loop counter |
| **L** | Line counter |
| **LD** | Line data (Y coordinates and effects) |
| **M** | General variable |
| **MC** | Maximum number of captions |
| **ML** | Maximum number of lines per caption |
| **N** | Current caption number |
| **NC** | Number of captions in memory |
| **P** | Pointer for line information |
| **X** | Horizontal screen position |
| **Y** | Vertical screen position |

## PROCEDURES

| | |
|---|---|
| **add** | Add a new caption if there is enough room |
| **bgnd($,#,#)** | Draw background for current line of text |
| **change(#)** | Change the contents of a selected caption |
| **delay** | Set the display time for captions |
| **edge($,#)** | Print current line using edged text |
| **fault($)** | Report silly mistakes |
| **guide** | Menu two for editing captions |
| **help** | Report fatal errors in a controlled manner |
| **insert** | Insert a new caption |
| **load** | Load new set – warning if memory full |
| **menu(#)** | Menu one for load, save and display options |
| **norm($,#)** | Print normal text with/without drop shadow |
| **oscli** | Give access to OS commands |
| **place** | Place a caption anywhere on the screen |
| **run** | Run caption sequence using display params |
| **save** | Save captions – warning if filename exists |
| **title** | Display the program title |
| **unit(#)** | Number and display each line of caption |
| **view(#)** | Use display parameters to show caption |
| **wipe** | Scan captions and delete if not required |
| **xtra** | Remove spaces from start and end of lines |
| **yn** | Edit displayed caption? (Y/N) |
| **zero** | Initialise all of the program variables |
| **in(#)** | Input a fixed number of characters |
| **x($)** | Calculate horizontal position for text |
| **yn** | Return the answer to a yes/no question |

*Where a procedure or function takes parameters # indicates a number and $ represents a string*

Turn to Page 24 ▶

# The keys to L

**FOR the last four months we've been looking at Bill Hensman's solution to the mathemagical adventure *L*. A number of you have let me know how new avenues have been opened for you and have asked for even more. So now, as we reach the end of the series, I'm devoting my main column to it. The final phase of the fantasy centres on the Circular room, which has eight exits. The solution deals with each in turn.**

North takes you into a cupboard, inhabited by Drogo guard 121 and a broken calculator. Typing 11 prevents you being arrested but doesn't remove the guard. To do this, you must get the calculator and produce the number 11 using its limited capabilites.

The available keys are 4, 7, –, * and =. A number of solutions are possible and Bill suggests one starting with 44 and using a repeated subtraction. The guard will eventually vanish and allow you to escape.

Going NW from the circular room takes you to a route which divides, one way leading to a black and white room which is a dead end. The other route, N, leads to a ladder and up goes to a trapdoor.

If you continue up to get into the attic you find that the trapdoor cannot be re-opened. This is, in fact, the prison to which you are sent on being captured by the Drogo guards.

To escape kick the door and a guard will appear, so type his square root to make him vanish and the door will be left open. Make your way to the room with the pig and CATCH PIG. You will see a grid displaying your relative positions. Allow the pig to move first and follow in such a way as to trap it in a corner.

You can now get the note and read it. Typing the word on the note teleports you to the old kitchen near the start of the adventure. West from the circular room returns you the way you entered and SW takes you to a computer room which is a dead end.

South leads into dangerous territory; there are many guards here and you'll need the spider's ring to get through. Heading SE takes you first to the room of bats. Entering a triangular number such as 21 allows you through, and if you get the ticket you can read a clue to the safe's combination.

East leads to another dead end and a coded plate: Bill has missed the significance of this one – it is in fact the names of the authors of *the* original adventure – **Colossal Cave**. You can also reach this place from the bat room.

Moving NW from the circular room to the safe – combination 4096 – brings you through to the

# Elite – the missions continue

My aim in this account of the Second Mission in **Elite** is to give you the best possible variety of experience so that you can succeed without too much trouble. As I mentioned last month, you are eligible for the Mission the moment you become *Deadly* but I advise a few more *Right on Commander!*s before actually using galactic hyperspace to transfer to Galaxy Three.

You will emerge in the locality of Xeinis – an Anarchy system – so I recommend using your fuel to enter a less dangerous environment such as Erinain unless you are quite confident of arriving intact. Once docked, you receive a message from Captain Fortesque of HM Navy indicating that you have been elected to perform a trivial task for which a reward is offered. Further details will be given when you arrive at Ceerdi, a mere 50 light years away.

The suggested route has three advantages – it affords an opportunity for a little trading, enables you to replace your galactic hyperspace drive in due course and, not least, gives you some combat opportunities in two Anarchy environments before Ceerdi, which is itself an Anarchy system.

So from Erinain travel via Laisis, Qusoxe, Quamaza (Anarchy), Beisria, Bireer, Rigebi, Xeverive, Lezaer, Rizaoris, Ceanbibi, Raave (Anarchy), Texeoliis, Uscequus, Oratzaa, Ceorat and thus to Ceerdi.

On arrival you receive a message from Agent Blake of Naval Intelligence. You are elected Chief Nuisance – so far as the Thargoids are concerned anyway. You must take the defence plans for their Hive Worlds to the naval station at Birera so that the navy can launch a decisive attack. What you *aren't* told is that the Thargoids have caught wind of this little jaunt and will be out to stop you. Oh and, by the way, Birera is very close to where you first emerged in Galaxy 3.

This route is designed to get you there as quickly as possible – trading was not taken into much consideration. From Ceerdi you should proceed to Iniser, Ansois, Releorar, Usenlaer, Geenbi, Tebe, Ededxebe – a quick profit here – Bixein, Maonle, Maer, Xeines (remember that?), spider. Bill remarks that this is a difficult unicursal route problem that is best worked out on paper first. Draw a perspective view of a cube by drawing two concentric squares – not overlapping – and link adjoining corners.

Now you can experiment with a route round the cube using pencil lines with arrows. Bill says that even then it is hard to keep track of right and left turns without turning the paper round constantly.

When you have succeeded, the spider will give you a ring which makes you invisible when worn. Now you are in a position to leave the spider, return to the circular room and move south safely. When you get to the princess's room drop the ring to bring the adventure to a rather abrupt ending.

As a postscript to this fascinating game, I have received a letter from two teachers at Sparrow Farm Junior School, Feltham, Middlesex. Messrs Richardson and Wales wrote to say that the game was used as the basis for a year's work by a class of 9 to 11-year-olds and was eventually solved by all members of the class with only the vaguest of hints.

They added that some readers, desperate for help, might find this a sobering thought. With their letter they included a solution sheet – which might be of interest to the general reader – and a booklet that would undoubtedly interest teachers.

I have examined both items and as a school governor in both primary and a comprehensive sectors I can say that they are superb pieces of workmanship. The booklet for teachers is a model of how the best educational use can be made of micros running a well-written piece of software. I strongly recommend writing to the school for further information.

Last comment from Richardson and Wales: *A word of praise for the creators of the program may not go amiss here – we have yet to find a mathematical adventure which has managed to capture the interest of both pupils and teachers in such a way".*

Until next month, happy adventuring.

# Hatter's Helpline

Barbara Gibb offers help to Charles Ewan – long stuck in **Franklin's Tomb**: She suggests that the wand and knuckle duster may well be red herrings, but they could be used in the pulley room as discards.

The pulley room is north of the north end of the hall and is easily entered accidentally. You need to be carrying your maximum load of six items for it to lower you to a maze of caves where an allegedly friendly bat keeps moving you around. Barbara comments that since there are two items to be found here and you must only be carrying *five* items for the pulley room to rise up again, two discardable items have to be found somewhere.

Remember the plea for help from Adam Burge in the December issue? Adam was stuck in **System 15000**, which I'd never heard of. A goodly number of you wrote in offering help and I've chosen the advice from Michael Leete on two grounds: First, he's an accountant and second, he needs help himself – in **Dodgy Geezers**.

Michael gives the scenario: You must use your AVS System 15000 communications software to transfer a million and a half dollars from REALCO – baddies – to COMDATA, the goodies. It's a question of getting needful phone numbers and access codes.

As the instructions tell you, contact Kingsdown on 672 3427 and enter code SL312. Subscribers include Perry & Co, code 421 which you enter to get Perry's access code INFRA. Dialling 493 5429 and entering the code gets a travel agent, Seadata, on-line. Together with a lot of garbage – Michael's words, not mine – is the information that the access code for Midminster Bank is MMBFR and a bulletin board number, 746 4460.

***Turn to Page 26*** ▶

## Problem Corner

**Neil Georgeson is stuck in *Pirate Adventure*, and I neither have a copy of the game nor a solution.**

**Can someone tell him what to do with the hammer, how to get through the locked door to get to the treasure island and finally how to get the sails on the boat if he needs to?**

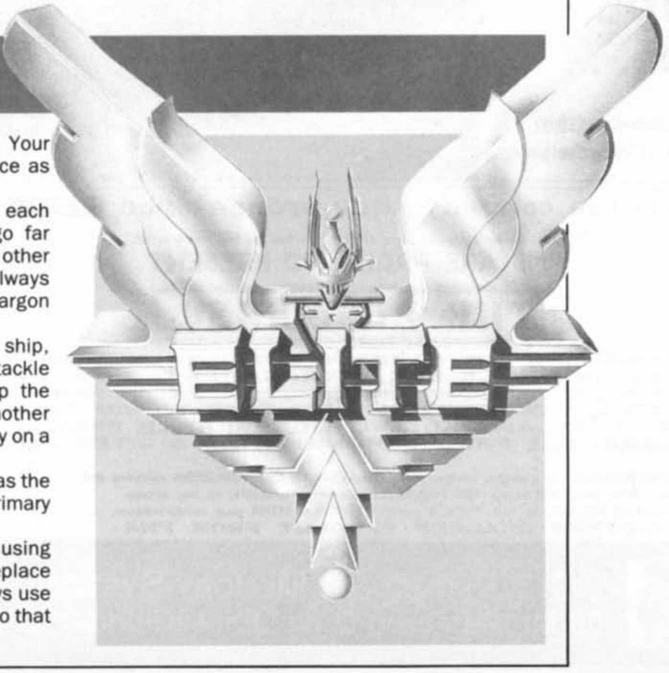
Xeesanus or Edriuson, Lelebi and Birera. Your reward is a naval energy unit, which is twice as effective as your civilian one.

A final word on combat: If you assume each system is an Anarchy one you will not go far wrong. Be alert, aggressive and destroy all other ships as soon as possible. Thargoids always travel in pairs – a mother ship and a Thargon drone.

The Thargon lingers behind the mother ship, but you should destroy it first and only then tackle the mother ship. You can always pick up the ejected Thargons after destroying the mother ship, but remember that you are not primarily on a bounty hunt.

If another ship appears at the same time as the Thargoid you can safely ignore it until the primary menace has been dealt with.

Only as a last resort should you consider using your energy bomb – it will not be easy to replace along the route I have given. You *can* always use the escape capsule, I suppose – but if you do that you don't have what it takes to be: *Elite*.



◄ From Page 25

Contact the board, mess around and disconnect.

Disconnection flags the next stage, so return to Perry and you'll find Boon is now listed. Return to Kingsdown – code 64 this time – for Boon's access code which you use to get another part of the bank's coding system. Perry's list also includes Routledge: Michael says you should wake up their computer, disconnect immediately then go and make a coffee or bake a cake.

Return and leave – literally – any old message. Disconnect, re-dial and you'll find a message with yet more bank code. Try it and you receive, among other things, the access code for Routledge.

If I read Michael correctly that's almost it. If you know all the answers he reckons it takes about 20 minutes to complete, apart from the compulsory break when the system shuts down for a full 10 minutes.

Now to Michael's own problem. He asks: *How do you stop the driver from showing off and attracting either the police or the baddies? I have a car full of loot and would like to sneak quietly off to the docks.*

What a way for an accountant to behave – it's nearly as bad as a vicar playing shoot-'em-up arcade games!

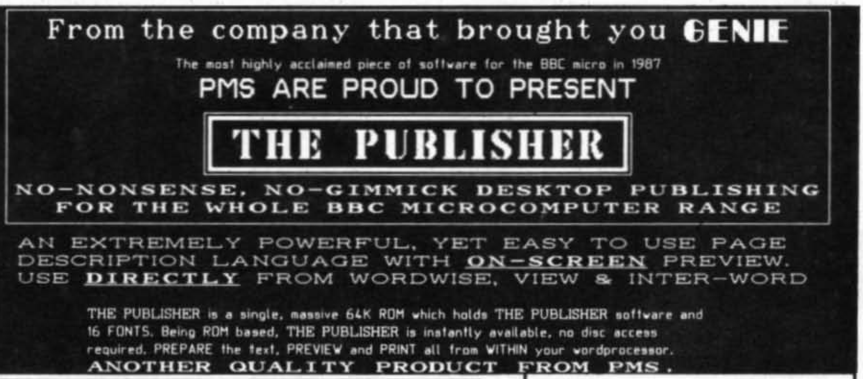
Barbara Gibb comes to the rescue here. Michael must be a tidy-minded accountant. It is essential to leave no clue whatever to where you've been. Replace all gratings, equipment and the like so that the sole substitution is the crate of nails for the crate of gold. Only then can you get away safely.

Finally, a gruesome **Hobbit** hint from William Hadden: If you kill Elrond, take the lunch and go to the small dry cave carrying the dead Elrond. You can kill all six goblins as they emerge by throwing the corpse at them.

NEW

What You See...

(Actual Screen Shot from within Wordwise)



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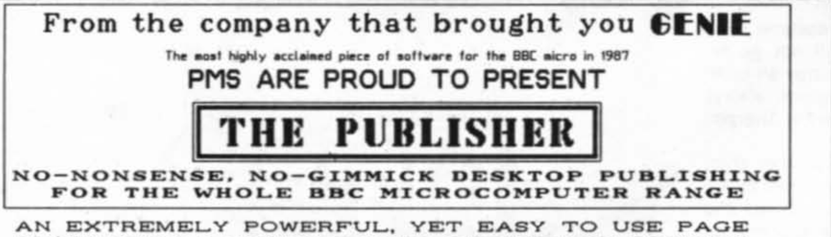

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# Slow, slow, quick, quick, slow

*Apply the brakes to your BBC Micro with Martin Barr's handy hardware*

**IN terms of speed the BBC Micro shows one of the cleanest pairs of heels around, and without doubt this is a positive advantage. However, anyone who uses or programs it frequently will know of situations where it would be useful to slow things down a little without recourse to wait loops or event routines, especially if this involves breaking into unfamiliar software.**

Well now you can. Using this simple and versatile controller you can vary the speed of your micro from maximum right down to stopped without the need for additional software. The unit allows you to slow listings and make impossibly fast games playable. You can even watch the machine build a complex graphic screen pixel by pixel.

The slowdown device utilises a feature common to most microprocessors – the heart of the machine – called interrupt request or IRQ. This is a pin on the chip itself which, when triggered, causes the currently running program to be halted and a higher priority routine to be executed before returning to the original.

The BBC Micro makes extensive use of the IRQ facility for such tasks as updating the clock and handling the sound and analogue-to-digital chips. When the 6502 receives an IRQ the processor status byte is saved together with the current program address and control is passed to the IRQ handler.

This routine checks all expected sources of IRQs and services the appropriate device as required. If none of the known resident devices has initiated the IRQ, the operating system assumes the interrupt was user-generated and passes control to a user-supplied routine. Control is then passed back to the original program, using the previously saved address, and it continues as if nothing has happened.

Now each time an external IRQ is applied to the 6502 the micro carries out its task of saving registers, checking known devices and going to any user routine before returning to the running program. And in carrying out these tasks the operating system expends a commodity we are interested in – time.

It may only take the order of a few hundred micro-seconds to handle each IRQ, but if we repeatedly generate them the net result is to slow the machine. Furthermore, if we can vary the rate at which we generate interrupts we can vary the micro's speed.

The hardware for the speed controller, which must be able to generate IRQs at periods between a few milliseconds to a few hundred microseconds, is shown in Figure I. There are only three connections to the micro – the IRQ output and the +5v and 0v power supplies. The unit connects to the Tube, as this is the only place where both IRQ and +5v are available together,

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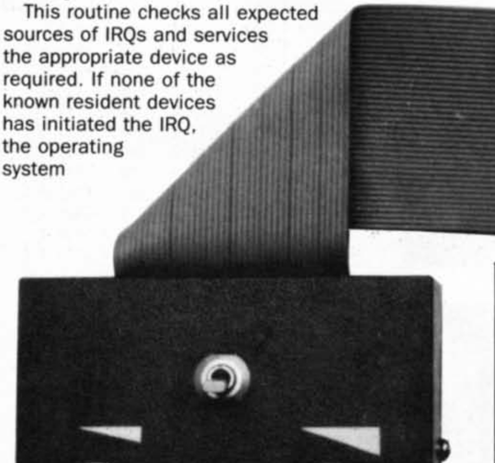

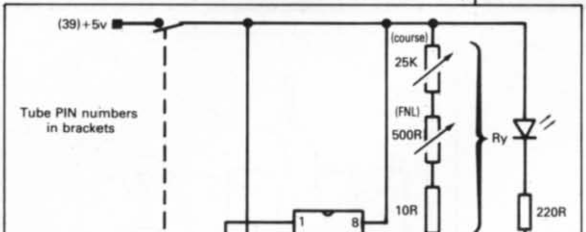

Figure II: The circuit diagram

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and this is the port which is unused on most people's BBC Micros it is also the most convenient. We need a length of 40 way ribbon cable and an IDC connector, but the total cost of the unit is still under £5.

The circuit can be constructed easily on Veroboard and the complete unit assembled in any small box able to accept the ribbon cable, such as the type supplied by jewellery shops with purchases. The Veroboard layout and complete assembly is shown in Figure II.

The double pole, single throw switch is used to allow the spare set of contacts to disconnect the output from the IRQ line when the unit is off so as not to inadvertently pull the line low. The LED is optional but acts as a reminder that the delay circuit is active.

To use it just plug it into the Tube and switch it on. The two knobs then control the speed of the micro, and at almost maximum can effectively freeze it. Judicious use of the fine control allows a sort of single stepping. If the two controls are left at maximum the on/off switch provides a pause/continue facility for those programs where this feature has not been included.

Although no software driver is required to use the unit, the addition of a small IRQ handler can increase its usefulness even further. A perennial problem when debugging machine code programs is keeping track of relevant memory locations, and even the use of breakpoints and single step is not always appropriate.

The routine in Listing I allows the contents of a defined memory location to be printed in binary at the top right of the screen while running another program. When it is run the interrupt handler is assembled at &900 and the user IRQ vector at &206, &207 is set up to point it. Once the handler has been installed the micro can be used as normal, the only proviso being that if Break is pressed the vector must be reset:

```
?&206=0:?&207=9
```

The Slow Box should be off whenever changing the vector to avoid a crash. Now, whenever the Slow Box is selected to on, the contents of location &70 will be continuously displayed in binary at the top right of a Mode 7 screen – you must use this mode, as it's the only one where characters can be stored directly to screen memory without using lengthy print routines.

A simple demonstration of the facility can be achieved with:

```
FOR X=0 TO 255:A=GET:?&70=X:NEXT
```

Each time a key is pressed the binary contents of &70 will be seen to update on the screen even though there is no PRINT statement. Listing II

Turn to Page 30 ▶

```
10 REM SLOW-BOX DEMO PROGRAM 1
20 REM by Martin Barr
30 REM (c) The Micro User
40 MODE7:FOR L%=0 TO 2 STEP 2
50 P%=&900:[OPT L%
60 LDA&FC:PHA:TXA:PHA:TYA:PHA
70 LDA&71:PHA:LDA&70:PHA
80 LDA&350:STA&70:LDA&351:STA&71
90 PLA:PHA:PHA:LDY#31
100 LDA#129:STA(&70),Y:INY
110 .loop PLA:ASLA:PHA:BCC zero
120 LDA#&31:STA(&70),Y:BNE nex
130 .zero LDA#&30:STA(&70),Y
140 .nex INY:CPY#40:BNE loop:PLA
150 PLA:STA&70:PLA:STA&71
160 PLA:TAY:PLA:TAX:PLA:STA&FC
170 .rtn JMP &FFFF:]:NEXT:*FX15
180 CLS:PRINT"Switch off Slow-Box"
190 REPEAT UNTIL GET:PRINT:PRINT
200 rtn!1=!&206:?&206=0:?&207=9
210 PRINTTAB(0,10)"Demo 1 Installed."
```

*Listing I: Memory location display*

**✓Get it right!**

```
 10 =    0 0     90 = EAE6 5
 20 =    0 0    100 =  9A0 4
 30 =    0 0    110 = 19FB E
 40 = 1C02 2    120 = F2F1 9
 50 = 7F14 B    130 =  8DC 1
 60 = D8B9 7    140 = CC59 5
 70 = 8CFF D    150 = C6EF 9
 80 = D6DC A    160 = F4CE C
                170 = FA90 3
                180 = C065 F
                190 = 6424 4
                200 = 1859 C
                210 = 4F16 A
```

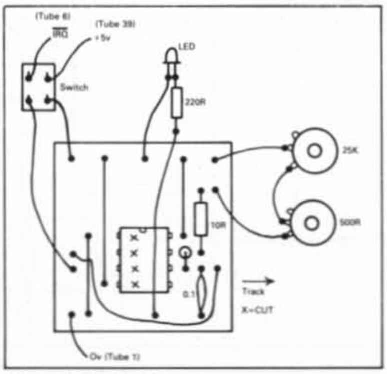
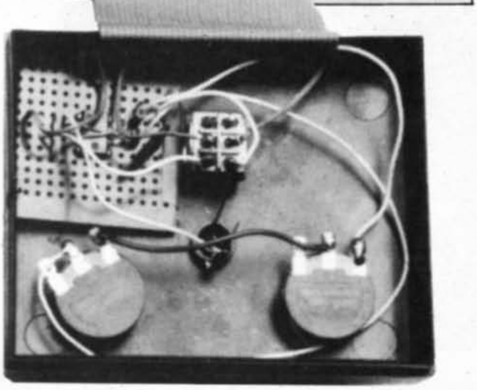


*Figure I: The hardware*



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◀ *From Page 28*

operates in the same way except this time the display shows the top of free user ram in hexadecimal. This facility is extremely useful and informative when programming in Basic.

After running it and selecting the Slow Box to on, type NEW and the display will show 1902 for standard disc-based systems or 0E02 for tape or on the Master. If you then enter a Basic program, each time you press Return the displayed value will increase as the amount of free memory decreases. Try typing:

```
DIMA%(50,50)
```

at the prompt and you will immediately see the value dramatically increase as Basic reserves space for the array.

If a Mode 7 program that is rich in variables is run, the display will fluctuate as variables are allocated values or are cleared. It is interesting to note that if the displayed value ever reaches &7A00 – near the Mode 7 value of HIMEM – the dreaded *No Room* error message will not be far behind.

When using either of the above routines, the speed controls would normally be left at minimum delay setting – maximum micro speed – so that virtually no slowing down occurs. If a combination of the display facility and slow down is required simply adjust the controls to give the required speed.

```
   10 REM SLOW-BOX DEMO PROGRAM 2
   20 REM by Martin Barr
   30 REM (c) The Micro User
   40 MODE7:FOR L%=0 TO 2 STEP 2
   50 P%=&900:[OPT L%
   60 LDA&FC:PHA:TXA:PHA:TYA:PHA
   70 LDA&70:PHA:LDA&71:PHA:LDA&72:PHA
   80 LDA&350:STA&70:LDA&351:STA&71
   90 LDY#35:LDA#129:STA(&70),Y:INY
  100 LDA&3:PHA:LSRA:LSRA:LSRA:LSRA:JSR
hex:INY
  110 PLA:JSR hex:INY
  120 LDA&2:PHA:LSRA:LSRA:LSRA:LSRA:JSR
hex:INY
  130 PLA:JSR hex:JMP exit
  140 .hex AND#&F:STA&72:CMP#&A:BMI num:
LDA#&37:BNE out
  150 .num LDA#&30
  160 .out CLC:ADC&72:STA(&70),Y:RTS
  170 .exit PLA:STA&72:PLA:STA&71:PLA:ST
A&70
  180 PLA:TAY:PLA:TAX:PLA:STA&FC
  190 .rtn JMP &FFFF:]:NEXT
  200 CLS:PRINT"Switch off Slow-Box"
  210 REPEAT UNTIL GET
  220 rtn!1=!&206:?&206=0:?&207=9
  230 PRINTTAB(0,10)"Demo 2 installed."
```

Get it right!

```
 10 =    0 0
 20 =    0 0
 30 =    0 0
 40 = 1C02 2
 50 = 7F14 B
 60 = D8B9 7
 70 = 1671 8
 80 = D6DC E
 90 = 7573 F
100 = E978 8
110 = A314 9
120 = 1D33 E
130 = 5EDE E
140 = 58C0 F
150 = A502 2
160 = F3B8 4
170 = 9586 7
180 = F4CE 2
190 = A4D5 2
200 = C065 E
210 = 69E5 B
220 = 1859 4
230 = AC15 2
```

*Listing II: Top of free User ram display*

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# SOFTWARE SCENE

## Fish ... you'll be hooked

*Price: £24.95 (disc)*
*Requirements: Archimedes (A310 or better for graphics)*
*Supplier: Rainbird, 74 New Oxford Street, London WC1A 1PS.*
*Tel: 01-379 6755*

I THINK it was George Bernard Shaw who, as an illustration of the zaniness of English pronunciation and spelling, suggested that the word *ghoti* could legitimately be pronounced as *fish*.

Certainly this latest offering for the Archimedes via Rainbird is zany enough to qualify for an accolade and is a further demonstration of the quality of Magnetic Scrolls adventures – their reputation is well deserved.

If, as I do, you have a rom expansion card fitted you'll have to *UNPLUG Podule before the adventure will load. The opening screen is a brilliant reproduction of the picture on the packaging and demonstrates again the Archimedes' superb graphics capability.

There are some suitably watery noises – you can't really call it music – as an accompaniment to the loading screen, interspersed with feline miaows – a threat of things to come.

I sat and listened while I studied the documentation which consists of a leaflet on how to look after your fish, a fish identification chart, an extremely funny booklet giving some useful – and not so useful – background information and, finally, a bus pass.

Apart from provoking responses ranging from a snigger to a full-blown belly laugh, the booklet has a number of uses. It indicates the type of input the parser will accept – and this is well up to present-day standards. Multiple commands and quite complex ones are accepted without trouble. It also has a section containing coded hints which are sometimes very useful and at others temperature-raising as they tease you about your lack of ability as an adventurer. Last, but by no means least, the booklet provides a copy protection medium for the program as well.

At various stages during play your boss will interrupt things and ask for a word from the booklet to be typed in before the game can proceed further. Three unsuccessful attempts mean that the program hangs up and the micro needs to be reset.

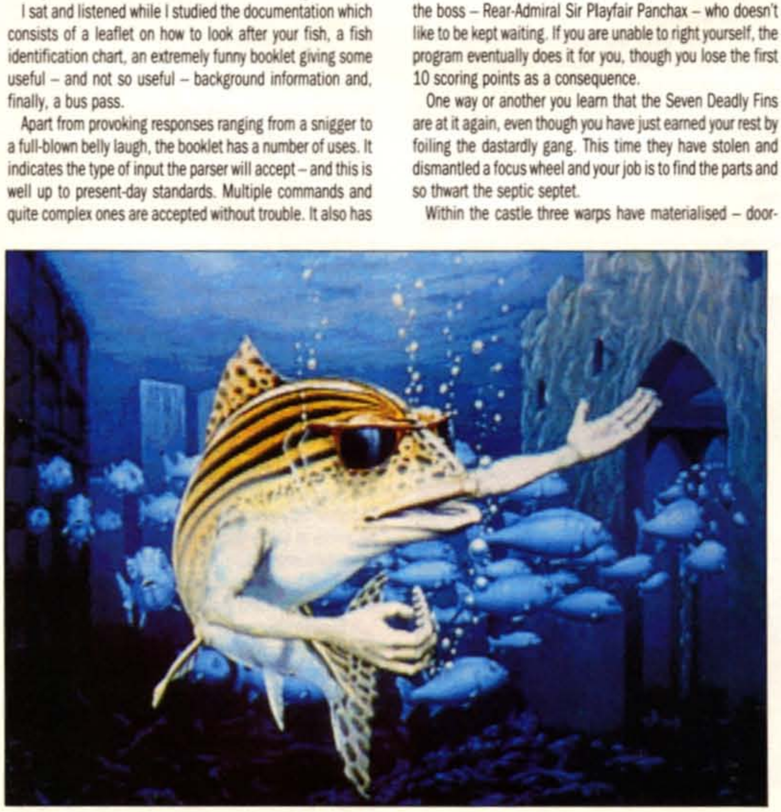
The screen is split between pictures and text and there are four mouse-operated pull-down folders just below the illustrations. These are clearly a standard Magnetic Scrolls procedure and provide various useful facilities under the headings *files, text, goodies* and *specials*.

The opening scenario is both amusing while at the same time setting a simple initial puzzle. You, an interdimensional espionage operative, are on vacation in a nice cosy goldfish bowl – honest – when an enormous hand drops a tatty plastic castle on your head.

Stunned, you turn upside down and are thus unable to enter the aforesaid castle and receive your instructions from the boss – Rear-Admiral Sir Playfair Panchax – who doesn't like to be kept waiting. If you are unable to right yourself, the program eventually does it for you, though you lose the first 10 scoring points as a consequence.

One way or another you learn that the Seven Deadly Fins are at it again, even though you have just earned your rest by foiling the dastardly gang. This time they have stolen and dismantled a focus wheel and your job is to find the parts and so thwart the septic septet.

Within the castle three warps have materialised – doorways to danger, bafflement and a lot of laughter.



The text is not quite so discursive as that in Level 9 adventures, but it has the ability to convey atmosphere very powerfully and economically:

> *As you enter the room you have a sudden vision: A girl dressed in white. A raised dagger. A scream.*
> *Altar room.*
>
> *This icy room has been sealed for a long time. Cold air slices through you; a chill foreshadow of your doom. Terrifying images flash into your mind. You feel that you have violated this place somehow.*
> *There is an ancient altar here.*

Vivid stuff – and the whole adventure is up to this standard of eloquence, whether it is attempting to chill the blood or tickle the ribs.

If you enter the smooth warp you arrive in a forest maze with different location descriptions. This type of maze is not particularly difficult to solve and is ideal for the kind of logical mapping technique that I favour.

There is a smithy to be found containing lots of useful items and, if you are quick, you can catch one of the Deadly Fins by surprise but you'll not follow his escape route. Things go with a bang in this area, and that's a major problem.

Entering the jagged warp lands you in the back of a van used by a ferociously bad hippie rock group whose roadie has gone off for some diesel.

The rubbish in the cab is illuminating and allows you to explore further and so make your way to a ruined abbey where the musicians are hard at work creating cacophony and where you'll also find the room with the chilling description quoted earlier.

If you decide to try the small warp you emerge into a recording studio, complete with florid faced producer fuming for coffee. Guess who could well spend time trying to make it – and the kitchen door is locked as well. There's the odd tip – or tape – to be picked up here and there, and there's a lot to be said for initiating your very own demarcation dispute. Just stay switched-on and out of the way and see what happens.

It is important to remember that Magnetic Scrolls adventures, like other first rank games, allow you to interact with the characters you meet. You can interrogate them, tell them things if you think it will help you and ask them to do things.

I am not quite sure whether to say that Fish is a program worthy of the Archimedes or that the Archimedes is worthy of a program like Fish. Either way, I think you'll see what I'm driving at. The box sports the slogan: One nibble and you're hooked. In this instance it's not advertiser's hype.

**Mad Hatter**

| | |
|---|---|
| ***Presentation*** | ***9*** |
| ***Atmosphere*** | ***9*** |
| ***Graphics*** | ***10*** |
| ***Value for money*** | ***9*** |
| ***Overall*** | ***9*** |

# Play It Again Sam 6 and 7 ... more firepower

*Price: £9.95 (tape), £11.95 (5.25in disc), £14.95 (3.5in disc).*
*Supplier: Superior Software, Regent House, Skinner Lane, Leeds, Yorkshire LS7 1AX.*
*Tel: 0532 459453*

PLAY It Again Sam 6 and 7 are the latest in a line of successful compilations from the Superior stable. Both packages feature games from the dim and distant past of the BBC Micro as well as fairly recent offerings.

**Galaforce II** is the successor to Kevin Edwards' best seller and is available only on Sam 6. Like its predecessor, it offers an unpretentious diet of non-stop mindless destruction. In a nutshell, it's Galaforce in which absolutely everything has been improved.

Better sound, better graphics, bigger sprites, lots of nice touches and a staggering increase in speed all contribute to creating a more than worthy successor to the ever-popular original. Hardened Galaforce fans will recognise quite a few of the aliens and battle formations in the new game, but this similarity is largely an illusion: There are many, many new ships and patterns to be mastered.

One nice touch – an aid to players and reviewers alike – is the inclusion of a level jump facility, first seen on Crazee Rider by the same author. On your first game you can only start on level one but as you progress you can choose to start on any level between one and the highest you've reached so far.

As with Kevin Edwards' other two offerings, Galaforce II features some great musical accompaniments. The general sound effects are also very good.

Between successive waves you are presented with one or more objects that look superficially like large packing cases. Each requires two hits to destroy it – if you dare. They are sometimes benevolent – giving you an extra life, a 1,000 bonus and other such goodies. However, they frequently have very nasty side effects, such as robbing you of your up-down or left-right motion.

This second detrimental effect makes you virtually a sitting target because the aliens come so fast that even a constant stream of laser bolts is often not enough to destroy the wave before one crashes straight through you.

Existing Galaforce fans – and anyone who enjoys shoot-'em-ups – will love Galaforce II.

**The Sentinel** could hardly be more of a contrast, requiring virtually no trigger skill. Strategy is the key – I once heard it described as the micro's answer to chess, and would be inclined to go along with that description.

The game's sheer size is almost beyond belief – 10,000 different levels, with not a multi-load in sight. The world of The Sentinel is displayed in superb 3D perspective with mountains, plateaus and yawning gullies to trap the unfortunate.

On a pedestal mounted on the highest point of the landscape stands your enemy, the Sentinel himself. He always stays on this pedestal but as soon as you make a move he starts to rotate. If he can see you, you're in big trouble.

The name of the game is energy – how to gain more as quickly as possible and how to keep what you've got for more than a few moments. You start with 10 units and can gain more – one at a time – by absorbing the trees and other objects placed randomly around the landscape.

You lose energy at the rate of one unit every five seconds when under the Sentinel's direct gaze. Your adversary is abetted by up to six sentries – smaller, less imposing versions of himself, but with equally deadly eyesight – stationed on lower promontories.

To move around you create a replica of yourself at the cost of three energy units, and transfer into the new body, regaining the lost power by absorbing your previous shell. The aim is to work your way up the surrounding terrain until you are higher than the Sentinel, at which point you can absorb him.

The Sentinel is quite simply one of the most brilliant and original games ever seen on any computer. Miss it if you dare.

I must say that I was rather surprised to see **Hopper**, Acornsoft's conversion of the arcade game Frogger, a real blast from the past. The idea is simple, you are a frog guiding a party of fellow amphibians to the safety of their riverbank homes within a time limit. You have to cross an increasingly busy main road, avoiding the cars and lorries. Once across you negotiate a river by jumping on floating logs and then on to the backs of swimming turtles. Fall off, and funny frog that you are, you drown.

PLAY IT AGAIN SAM 6
GALAFORCE 2
HUNCHBACK
HOPPER
THE SENTINEL
VIDEO'S REVENGE
ACORNSOFT
SUPERIOR SOFTWARE Limited
Compatible with the BBC B, B+ and Master Series Comp

Although Hopper does not attempt to challenge your mental capabilities, even six years after its initial release it's still a very enjoyable test of your reflexes.

**Hunchback** is, like Hopper, an antique given a chance to entertain a new generation. You play Quasimodo, the hunchback of Notre Dame, trying to storm the castle in which, Esmeralda is being held prisoner. The castle is on eight levels and you must swing, jump and run to find your true love.

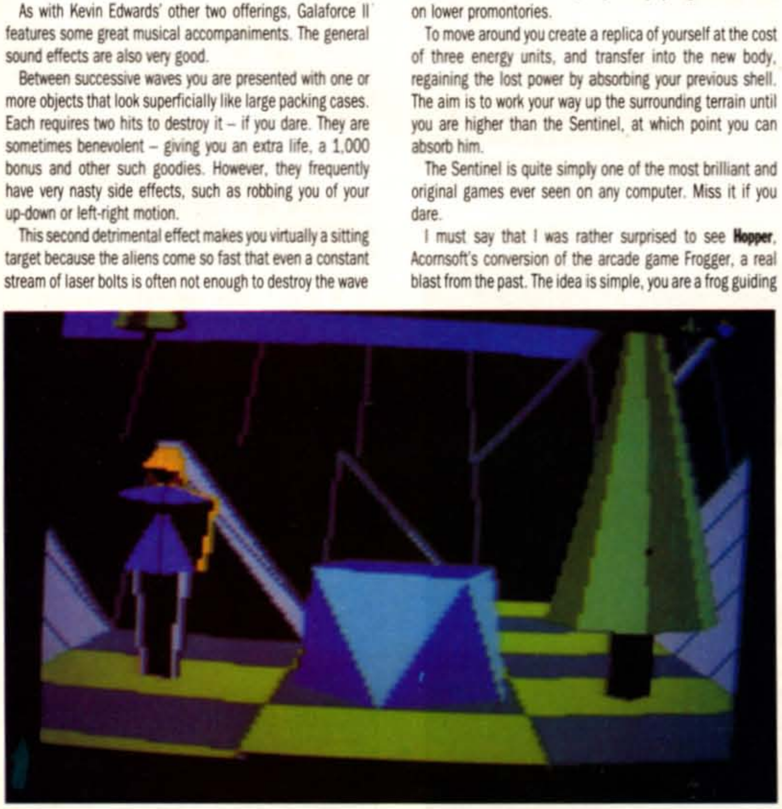
Moving on to Sam 7, **FireTrack** is probably the ultimate shoot-'em-up. It features amazingly smooth vertical scrolling arcade action that starts gently and speeds up at just the right pace until only the best stand a chance of surviving for more than a few moments.

The graphics are stunning and give an amazingly realistic 3D effect. What is more, for anyone who can spare the concentration, a number of familiar shapes and features are designed into the landscapes – a Pac-Man chasing power pills, the number 42 and many more. However, I had to be told about their existence – I was too busy trying to avoid the squadrons of enemy ships swirling around me in weird and wonderful formations.

FireTrack takes the ever-popular concept of a shoot-'em-up, transfigures it and implements it faultlessly.

In **Bonecruncher** you play the unlikely part of Bono, a little green dragon which lives in a castle by the sea. You have set up Bono's Bathing Company making skeleton soap – a commodity much prized by the monsters which bathe in the moat. The soap is made from skeletons collected from around the castle and boiled in your cauldron.

However, the castle is anything but safe. Not only are there trapdoors through which you would disappear without trace but some skeletons haven't stopped moving yet and they are



*Focus your mind before the Sentinel gets you*

Y IT AGAIN SAM 7
FIRETRACK
FIRETRACK
Electric Dreams' Smash Hit
BONE CRUNCHER
BONECRUNCHER
Superior's Humorous Soap Opera
SNAPPER
SNAPPER
Acornsoft's Arcade Classic
GHOULS
GHOULS
Micro Power's Ghostly Hit
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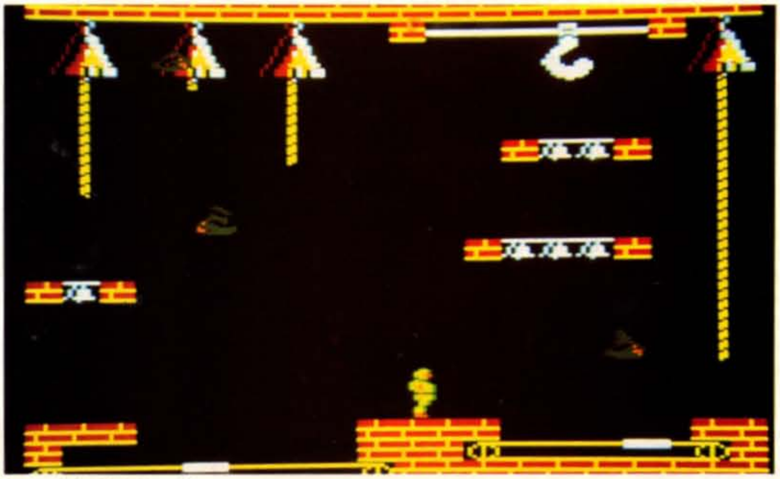
deadly. Another hazard is posed by giant spiders that rush around the walls biting any hapless dragons in their path. They will also eat any bones so it's often a race to collect the skeletons before they do.

Finally come the Glooks, large white creatures which love the smell of soap. When you have climbed up a stairway to supply another customer they move in the direction faced by the stairs. Although a Glook is not in itself harmful it will crush you if you get in its way when moving. Either that, or you find the way forward blocked.

However you can push one, or take advantage of its movement, to suffocate monsters and turn them into skeletons.

Fortunately, Bono's Bathing Company is not a one-dragon show. Your partner Fozzy is strong enough to hold monsters and spiders at bay, but he's not very bright. Always keep an eye on him to make sure that he is not trapped or wandering round in circles. When I first reviewed Bonecruncher in March 1988 I thought it would delight game players of all ages – and I see no reason to change that opinion.


*Running into trouble for Esmerelda*

**Snapper**, Acornsoft's implementation of the ever popular Pac-Man, was the very first game ever released for the BBC Micro.

As Snapper you scour a maze, chomping all the dots. Pursuing you are four bug-eyed baddies that initially follow pre-programmed paths but before very long begin to converge on you.

Fortunately there are four power pills, one at each corner of the maze, which when munched give you a limited period of invulnerability. The baddies now turn blue with fear and you can eat them for extra points. But you must strike quickly, for the effect soon wears off.

Snapper's gameplay offers little variety, but it's still very addictive.

I see **Ghouls** as the only disappointment. Although popular in its heyday, it falls well short of the other offerings' standard. It's a very basic platform game, similar in design to Manic Miner. However, Ghouls features none of its finer touches – the graphics are crude, the keyboard over-responsive and the gameplay leaves a lot to be desired.

Like Manic Miner, Ghouls features a number of levels but the only real difference between them is the layout – the graphic features seem identical from one screen to the next.

The sound effects are quite good – particularly when you lose a life. It also features a lively piece of music that plays when you complete a level and a haunting melody while waiting for you to enter your name on the high score table.

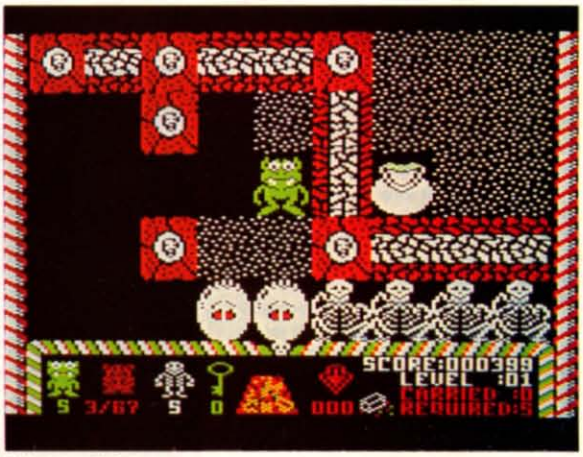
Ghouls may appeal to dedicated fans of platform games, but so many better examples are available that it must be considered a makeweight for the three real stars of this compilation.

**Hac-Man**

| | |
|---|---|
| *Sound* | *8* |
| *Graphics* | *8* |
| *Playability* | *9* |
| *Value for money* | *8* |
| *Overall* | *8* |

SCR
420
HI
30000

*Ultra-speed mayhem*


5
3/67
5
0
000
SCORE:000399
LEVEL :01
CARRIED :0
REQUIRED:5

*Making bones with Bono*

## Castle Blackstar ... dragons and broomsticks

*Price: £2.99*
*Supplier: CDS, Beckett Road, Doncaster DN2 4AD.*
*Tel: 0302 21134*

COULD you resist the goddess Artemis when she asks you to find and return her power orb? Of course not, particularly as she promises to let you keep any other treasure you find once she has cleansed it of evil. It will be a long and difficult task as the orb is well hidden somewhere in the vast passage and cavern system beneath Castle Blackstar.

In this budget text adventure you start on a dusty road which leads to the castle. Stray from this and you enter a maze of woodland locations which must be mapped to find three extremely important places.

Getting into the castle is your first real task. Most of the treasures are well protected by devious boobytraps, and the inevitable troll and dragon could give some trouble, particularly the dragon if approached from the wrong direction.

As almost everything found is a treasure, and therefore has to be cleansed before you are credited with full points, there is a lot of to-ing and fro-ing between the castle and temple. Your carrying capacity is limited to eight items, so knowing the shortest route to base is useful.

Along the way you will also discover such exotic places as a gingerbread cottage, several pits, a gold mine and throne room before reaching your goal, the power orb.

Few weapons are found, or in fact needed, and your only advantage is that the goddess wants you to succeed and will resurrect you several times if necessary.

Originally released in 1984, this adventure, with its one and two word inputs, is less demanding than the more modern ones. The screen layout is nicely arranged, with the score and move counter in the top right hand corner, the present location identification top left and the inputs and location descriptions scrolling underneath. Responses are quick and in clear white on black.

Considering the adventure's size, descriptions are quite lengthy and the response to EXAMine helpful.

I suppose it is inevitable that Castle Blackstar will be compared with other adventures. Well it's nearly as good as Dungeon Adventure by Level 9 which comes readily to mind. The lovely ending has you looking down on earth from a broomstick – magic.

**Barbara Gibb**

| | |
|---|---|
| *Atmosphere* | 8 |
| *Playability* | 9 |
| *Presentation* | 7 |
| *Value for money* | 10 |
| *Overall* | 9 |

## Superman ... facing super problems

*Price: £9.95 (tape), £14.95 (disc)*
*Supplier: Tynesoft, Addison Industrial Estate, Blaydon, Tyne & Wear NE21 4TE.*
*Tel: 091-414 4611*

I'VE really been looking forward to this opportunity to become the biggest hero in popular comics. Writing plots for a character who has ultimate power normally, but none at all in the presence of green kryptonite is tricky on paper. But the limitations of the game screen help to solve the problem.

In the various game sections you have access to some of the great hero's super powers – flight, heat vision, super breath and super strength in the form of a punch – and each problem is solved by using certain abilities, but only one combination at a time.

The game occupies more than 300k so the 40 track version comes on four sides and you are prompted to change discs as needed. On booting up the first side you are treated to the jealously guarded copyright notices and an animated Tynesoft logo similar to the sort of thing film companies put on their productions.

Then you move to the start of the comic strip: In a series of panels the plot is revealed by the editor of the Daily Planet, Perry White. It seems that Darkseid and his parademons are attacking and you have to stop them.

You then flip to the playing screen where a small area of the right hand side shows Superman flying into the screen and the baddies coming towards you, while the left gives energy level, score, time taken, how far through the level you are and which super power is in use.

Darkseid and his cronies emerge from a strange opening in the sky and fly down at you. Using super breath you can blow them backwards, but only a few hefty punches or zaps with heat vision disposes of them for good. Of course, they don't just hang around to get blown away, but shoot energy-draining bolts at you. A bigger ship which fires two shots at a time comes down a little later. As far as I can tell the only way to move to the next level is to kill the opposition fast. If you are too slow they just keep coming.

Another comic strip relates how Lois Lane and the state governor have been captured on board the SS Atlantis, so off you go to rescue them. This time the playing screen scrolls horizontally as you run down the ship's corridors meeting seemingly endless robots firing fireballs and dropping bombs. Heat vision comes in very useful here.

After the next bit of storyline you find yourself protecting a space shuttle from a meteor storm let loose by Lex Luthor. You are invulnerable, but the cunning villain has mixed green kryptonite asteroids with the others, and you must avoid getting hit by them at all costs. Heat vision (most useful) and super strength are available in this vertical scrolling section.

Now it turns out that Lex Luthor has reprogrammed the on-board defence robots of the Star Lab satellite and you have to fight your way through them in a slightly more vicious version of the SS Atlantis conflict.

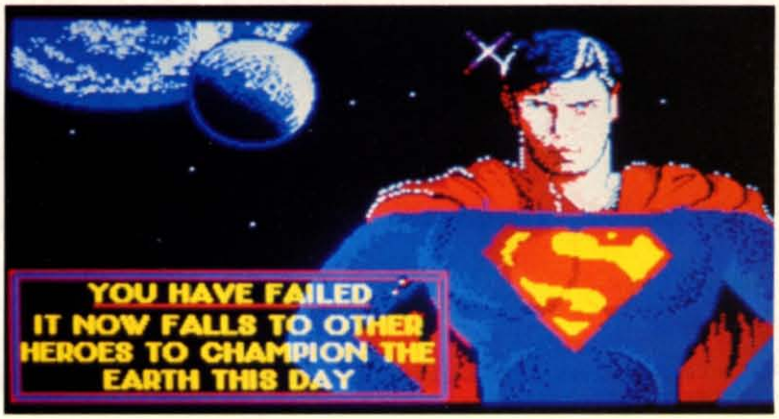
The next battle involves further asteroid storms, this time directed at the Star Lab. And after that it's even more meteors, with the inclusion of rather unpleasant mini-droids protecting the LexCorp satellite. Having disposed of the outer defences you enter a satellite station for an encounter, again similar to the SS Atlantis fight – horizontally scrolling with a much bigger selection of baddies until you finally reach the centre and annihilate the geodisrupter.

In a way this is a compendium of games with a single theme linked by comic strip pages. It mimics a Superman story quite well, and there is a plot. It's certainly an impressive piece of work and very well implemented. My only criticism is the rendition of the Superman theme which should have been done better or left out.

Superman isn't easy to play, but it's great fun.

**Lazarus**

| | |
|---|---|
| *Sound* | 6 |
| *Graphics* | 8 |
| *Playability* | 8 |
| *Value for money* | 9 |
| *Overall* | 8 |



YOU HAVE FAILED
IT NOW FALLS TO OTHER
HEROES TO CHAMPION THE
EARTH THIS DAY

## *Circus Games ... four ring fun*

*Price: £9.95 (tape), £14.95 (disc)*
*Supplier: Tynesoft, Addison Industrial Estate, Blaydon, Tyne & Wear NE21 4TE.*
*Tel: 091-414 4611*

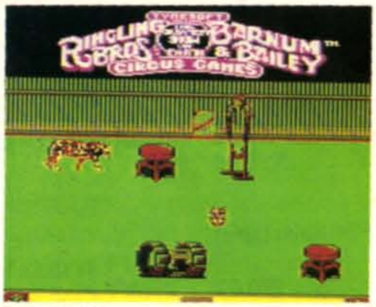
RESPLENDENT in sequined tights and a lurex leotard I step flamboyantly into the circus ring. Stefan Brookolini, master of the high wire and tamer of big stripey pussy cats, is ready to take part in the circus spectacular of the year.

Up to four players can compete in the big top tournament, a four event extravaganza that includes tiger training, tightrope walking, trapeze and trick horse riding. I suggest you take advantage of the practice option – at least there will be no audience to laugh as you plummet to any of your three deaths.

The tiger training event was quite puzzling. According to the instructions the ring should have contained an obstacle course over which the tiger was to be guided, a tiger-head cursor, a tiger and me. All of the aforementioned items were present except for one – me. I was nowhere to be seen.

I can only assume that my absence was due to a bug in my pre-production copy and not extreme cowardice on my sprite's part. Although this is an interesting spot, the tiger's colours were very poor indeed – he looked mottled rather than striped.

Old timers who remember Superior Software's Hunchback will have a distinct advantage when playing event number two, the trapeze. By moving your legs at the correct time you can increase the height of your swing – one of the critical factors affecting your success. Swing too high and you will soar into the lights, too low and you will plummet like a falling star. As if swinging wasn't enough to cope with, you must time your release so that the far trapeze is within your reach as you complete your graceful arc across the ring. And if you intend scoring any points in this event you had better produce an assortment of twists and somersaults to impress the judges.

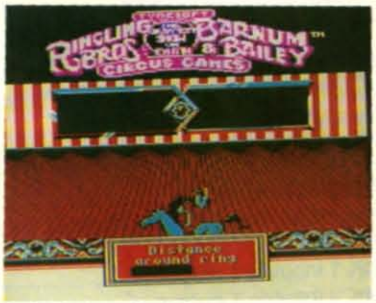


*Tiger training: Quite puzzling*

The tightrope event employs a dual view display – the walker is seen both from the side and above. The top view allows you to see when you are beginning to over-balance to the left or right, a situation which can be corrected by using the appropriate keys.

A remarkable degree of realism has been programmed into this event. Just as in the real discipline, there is a tendency for the inexperienced walker to make a dash for the far podium. This invariably results in the artist proving Newton was right about gravity.

The final event is the easiest of the four. Sitting and standing on a galloping white charger you have to perform a series of somersaults and handstands. Once again the left and right keys are used to maintain your balance while the fire key initiates any of four breathtaking stunts.



*Breathtaking stunts on horseback*

All events are realistically animated and respond well to the controls, but apart from the title tune, sound is limited to a few beeps.

Circus Games is a new and interesting variation on the decathlon type of program that has proved so successful over the years. I see no reason why this one should be any different.

**Steve Brook**

| | |
|---|---|
| ***Sound*** | ***7*** |
| ***Graphics*** | ***8*** |
| ***Playability*** | ***8*** |
| ***Value for money*** | ***8*** |
| ***Overall*** | ***8*** |

## *Football Director ... shame about the game*

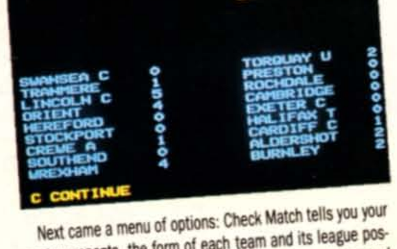
*Price: £9.99 (tape), £12.99 (disc)*
*Supplier: CDS Software Ltd, Nimrod House, Beckett Road, Doncaster DN2 4AD.*
*Tel: (0302) 321134*

FOOTBALL Director is the latest in a long line of attempts at simulating the job of the manager of a Football League team – not a director. In fact the only connection between this and a director's job is that you can spend £300,000 on a new stand.

The game runs in text only Mode 7 with next to no sound and there's nothing that makes up for the omission. I quickly found that, despite the long list of features mentioned on the packaging, there's actually little to do.

Your aim is to lead a team up through all four divisions of the Football League. As well as trying to gain promotion to the First Division there are the two domestic competitions – the FA and League Cups – plus, if your team qualifies, three major European competitions. There are, 79 other teams competing against you.

Playing for the first time, you are presented with a choice of 80 teams – which always start in the Fourth Division with £500,000 and 12 players. I have a soft spot for Cardiff City, so I chose that.



```
TIME 90 MIN   FULL TIME        HOME
BRISTOL R (0)1                 WOLVES        (3)3
WARD         69 MIN            HAMILTON     8 MIN
                               MANTON       9 MIN
                               GRAHAMS     45 MIN

                               TORQUAY U        2
SWANSEA C         0            PRESTON          0
TRANMERE          1            ROCHDALE         0
LINCOLN C         5            CAMBRIDGE        0
ORIENT            4            EXETER C         0
HEREFORD          0            HALIFAX T        1
STOCKPORT         0            CARDIFF C        2
CREWE A           1            ALDERSHOT        2
SOUTHEND          0            BURNLEY
WREXHAM           4

C CONTINUE
```

Next came a menu of options: Check Match tells you your next opponents, the form of each team and its league position. Check Squad lists all your players, their positions and form. And it's here you can change their positions in the team, sell them or edit their names. The Transfer Market lists players available for you to buy.

Other useful options include Bank from which you can make loans or obtain mortgages – both at exorbitant rates of interest – and one which enables you to employ a scout to keep an eye open for players you want – a waste of £200 a week. You can also hire or fire a physio to treat injured players or a coach to run a youth squad. You can alter the level of difficulty, which is good, but what I detest is that the program itself changes it if you get too good. Every time I built a team which was in the running for promotion to the Third Division the level increased and, suddenly, a team which was practically unbeaten for 12 or 13 games failed to win any more that season. I don't mind it re-setting difficulty, but it should have waited until the end of a season.

The main option is Play Match, which lasts about 15 seconds – not nearly long enough to build any tension. Also once it starts you can't do anything to improve the performance of your side. At the end of the match you get the rest of the divisions results and then a rundown of the club's financial position.

I've seen a lot worse, but with a bit more work it could have been a great deal better.

**Llewellyn**

| | |
|---|---|
| ***Sound*** | ***N/A*** |
| ***Graphics*** | ***N/A*** |
| ***Playability*** | ***7*** |
| ***Value for money*** | ***6*** |
| ***Overall*** | ***6*** |

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# PROBLEM SOLVED

## Archimedes experiments

I AM interested in buying a ready-assembled version of the Experimenter's Board to use with my Archimedes. I have the necessary I/O card but have noticed that the Archimedes' printer port has a different connector to that on the BBC Micro. Is there an Archimedes version with the correct lead? – **E. Hughes, Swanwick, Derbyshire.**

● *The Experimenter's Board can be supplied with an Archimedes lead if you request one when ordering. Due to the way the software works you have to access the printer output via the VDU commands – as if printing – and control lines CA1 and CA2 are linked together to fool the Archimedes into thinking that a printer is attached.*

## Time stop

I READ with interest the letter in your February issue about the Master with the clock not functioning. Mine doesn't work either, but always reports the same date and time until reset. I tried the program you gave but the clock still doesn't run. In all other respects the micro operates properly. What is wrong? – **R. Lambert, Northampton.**

● *If your clock refuses to change time you have a faulty clock chip or clock crystal and the only solution is to replace them.*

## Files in limbo

WHEN copying a file from one disc to another on an Archimedes with a single 3.5in drive, a seemingly fine disc suddenly came up with a broken directory error and refused to let me access my programs. Is there any way of getting round this so I can look at my files, or is there an 800k ADFS file recovery program that I could use? – **B. Halifax, London.**

● *A broken directory means that the disc filing system can't read the information that tells it where the files are on disc. The problem can occur if you get the disc swapping out of sequence.*

*You probably can still look at the contents of the disc using a sector editor program and, with a lot of skill and patience, you might be able to reconstruct the directory. Unfortunately full details are beyond the scope of this column.*

*There is a new disc format on the new Risc OS which keeps a duplicate directory and that should make file recovery easier but, as yet, I don't know of any file recovery programs. Your experience illustrates the importance of making backups of vital files.*

## Page faults

I OWN a tape-based issue 4 BBC B which has served me well for four years. Recently I switched it on and found that I couldn't CHAIN a program without getting a *No room* error message. Eventually I checked the various memory pointers and found that PAGE had moved up from &E00 to &F00. I have tried switching off and on, pressing Break, and Control+Break, but PAGE always defaults to &F00.

If I type:

```
PAGE=&E00
```

and load a program the micro behaves normally, but on pressing Break PAGE returns to &F00 and I have to enter PAGE=&E00 before continuing.

Could you suggest which chip is malfunctioning so that I can replace it? I am also thinking of upgrading to discs in the future. Would the problem disappear anyway if I did so? – **G. W. Moore, Brantham, Essex.**

● *When the micro is first switched on it issues a call to all the sideways roms asking if they want to reserve some private workspace. If they do the effect is to alter the PAGE setting. I would suspect therefore that you have some sideways rom fitted that is reserving some memory.*

*When you change to using discs you will find that PAGE is set even higher and you will have less room – but extra shadow ram will help solve this problem. If you have no sideways roms fitted there is a fault in your micro, most likely in the Basic or MOS rom, or possibly the ram.*

## No return

MY Master 128 has a faulty Return key which doesn't respond unless it is pressed down very firmly. If the key is pressed on the right side it responds a little better, but it is still unreliable.

**Turn to Page 38 ▶**

### On the agenda...

- **Experimenting with the Archimedes**
- **Recovering lost files**
- **Problems with PAGE on a BBC Micro**
- **Adding 5.25in disc drives to a Compact**
- **Getting Return to do its stuff**
- **Time stands still for a Master's clock**
- **Losing characters when printing in colour**
- **Choosing the right image-grabbing hardware**
- **Upgrading to the Risc OS – and its risks**

◄ From Page 37

Does it need replacing and can I do it myself? – **Mr Tupperman, Rhyl.**

● *As Return gets a lot of hammering it is likely that it might develop a fault. However more likely is that the track around the soldered joint of the switch has developed a hair line crack due to the slight – but continual – flexing of the keyboard PCB.*

*You will probably be able to see this as a black line. The solution is to scrape back a little of the green solder mask from the board and solder a wire from the track to the switch.*

*You can test for any crack using a continuity meter. However if the key itself is faulty it should be replaced. On some keyboards the key is a double switch and it is most unlikely that both will have broken.*

## Too many sides

I HAVE a Compact with the standard 3.5in disc drive and recently obtained a 5.25in, 40/80 track switchable, double disc drive. Can I have both drives connected to my micro at once? – **P. MacFarlane, Falkirk, Scotland.**

*This is quite a simple matter to arrange, you just have to install switches on the drive select lines of the bus. As the 3.5in drive is connected internally you will have to modify the internal wiring to do this. However BBC Micros can only handle four disc sides and you have six.*

*The best set-up would have the internal drive as sides 0/2 – standard – and one external one always as 1/3. Then install one switch to swap between the internal and the second external drives. While the task is really quite simple, you may prefer to have your local dealer make the changes.*

## Putting it on paper

I HAVE just read with great interest your review of the Watford video digitiser in the January issue and have a few points on which I would be very grateful for your comments. Is the resolution of 512 x 512 really good enough to produce an accurate representation of an image? Can a picture be downloaded from a video camera, for example, to a colour printer such as an Integrex?

Do you think hard copy from the digitiser is as good or better than a similar copy from a scanner? – **D. Cooper, Chapel-en-le-frith, Stockport.**

● *It all depends on what you mean by good enough. 512 x 512 is the sort of resolution you get from a TV camera, but the resolution of the Watford system is 256 x 256. You must judge for yourself whether it meets your criteria.*

*You can use a video camera as a source, but remember the Watford system is only monochrome. If you want colour there is a unit on the market by Lindis International – available from Norwich Computer Services (098685 476)– which allows you to get a colour signal over three frames. You can then get a hard copy. Musbury Consultants has a suitable screen dump program for the low cost Integrex or Canon ink jet printers but, naturally, you can get better results with the more expensive colour printers at around £3,000. These will not produce results as good as scanners because they work to a resolution of 300 dots per inch, which is much greater than that of the Watford digitiser.*

## Colour dumps

WHEN I use an Integrex colour printer with my Archimedes I keep losing the odd character. This results in a line of rubbish in place of the graphics data I was sending it. I am sure it is not my program: Is it a bug in the operating system? – **R.T. Johnson, Pinner.**

● *The problem is not in the software but the hardware. The strobe signal sent out by the Archimedes is not very beefy and sometimes gets lost, especially on Integrex printers. The solution is to buffer the strobe line through an extra chip:*

*Place a 74HC14N over IC9, remove pins 5, 6, 8, 9, 10, 11, 12 and 13 and solder pins 7 and 14 to IC9. Now lift the legs of pins 2 and 3 and solder them together. Then remove one end of R24 from PCB – the end closest to IC9 – and solder the free end to pin 1 on the new chip. Solder pin 4 to the hole from which R24 was removed.*

*All new Archimedes are being modified in this way. If you doubt your ability to do it yourself go to your dealer and ask for Field Change order 2002.*

## New changes

I AM interested in the new operating system for the Archimedes. I would particularly like to know if there is any incompatibility with existing hardware and/or software. I would also like a hard disc drive in the near future. Will there be any problems with my existing set-up and/or with the Risc OS chips?

I have used BBC Micros since they first appeared, and I think they are the best ones on the market. Logistix and 1st Word Plus are excellent and I use both constantly. I also use both the White Knight 12 and Colossus Chess on my Master. Is it possible to get either of these programs to run on the Archimedes 310? Alternatively, are updates of these programs available or planned? – **F.A. Bery, Spalding, Lincs.**

● *Risc OS is not only compatible with all standard Acorn software but it's a must if you are going to use your Archimedes to its full potential. It is envisaged that by as early as August this year all new software will be specific to Risc OS with no guarantee of working under Arthur.*

*We know of a few cases of incompatibility with the new system, namely games and the Armidillo speech digitiser, but all the sofware houses now have compatible versions, so contact them if you find something will not work. An improved BBC Micro emulator is provided with Risc OS, so your old Master software stands a better chance of working.*

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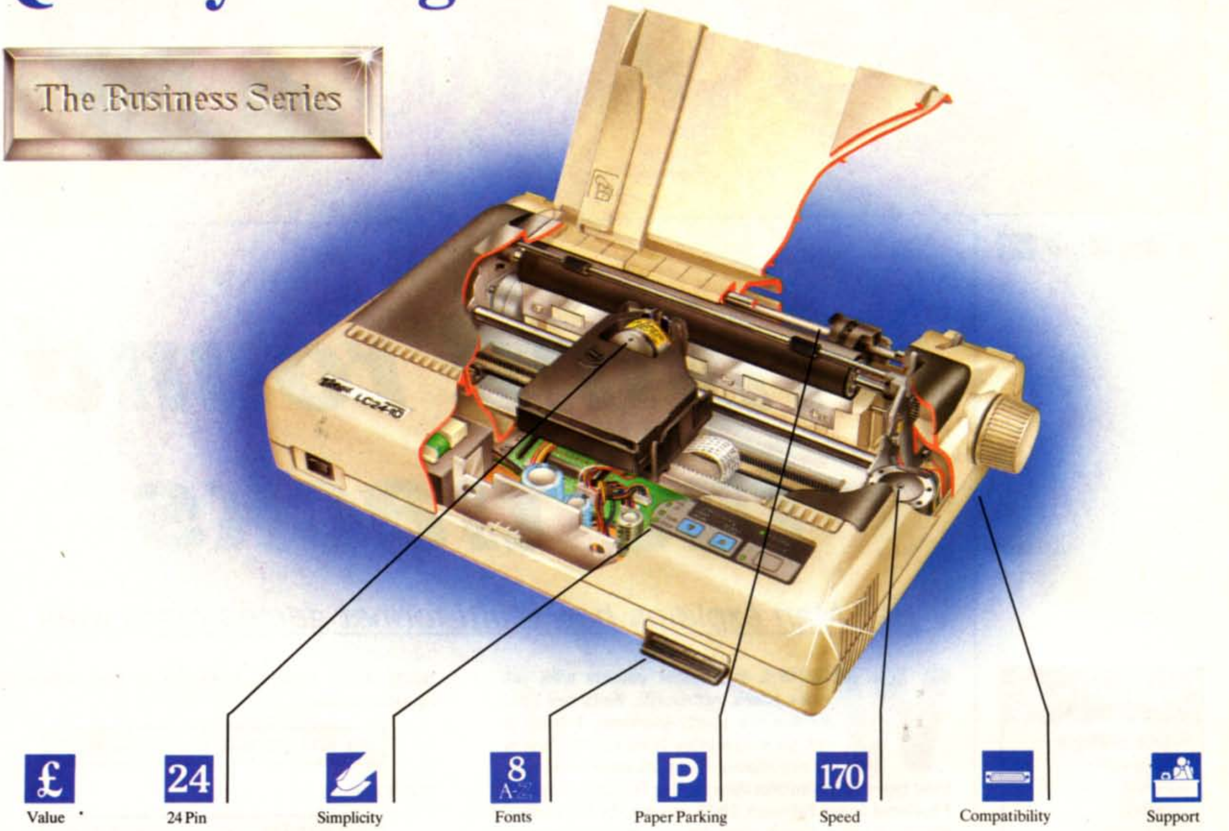

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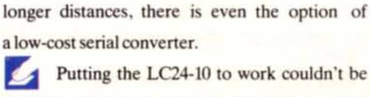

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# Driving round the tracks

## Hac Man explains how multi-format games discs work

**Featuring:**

- **Palace of Magic**
- **Crazee Rider**
- **Galaforce**
- **Quazer**
- **Orion**

**WELCOME to another column with yet more pokes, passwords, hints and tips. Before we start, however, I have a couple of apologies to make: The first is to any Master Compact owner who may have typed in the infinite lives routine for *Labyrinth* that I featured in my February 1988 column. As the routine stands, it will not work correctly on a Master Compact with only one drive. The problem lies in line 120: The *MOUNT 1 command should read *MOUNT 0 or simply *MOUNT. Other than this, the cheat works perfectly.**

The second apology is to owners of the disc version of **Palace of Magic**. When I wrote the invulnerability routine that appeared in last November's column it worked perfectly. However, as I incorporated the listing for the poke routine into the rest of the column, a couple of typing mistakes crept into it. Line 80 in the published routine reads:

```
LDA #&A9:STA &4461:LDA #0:STA &4462
```

but it should be:

```
LDA #&A9:STA &4661:LDA #0:STA &4662
```

While on the subject of Palace of Magic, I mentioned in last month's column that this arcade-adventure was also available on a compilation – Superior's Play it Again Sam 3. I also said that the game's cassette and disc loaders had probably been modified so that the invulnerability routines that I featured in last November's column would no longer work.

At the time, I had not had a chance to look at my copies of Sam 3 but I have since examined them and the cassette version of Palace of Magic is – to all intents and purposes – identical to the original, and the published cheat works on Play it Again Sam 3.

The disc version is, however, slightly different for reasons that may be worth explaining in detail. The original game was released on a 40/80 track disc which is formatted in such a way that a certain group of track numbers appears twice. The data is then recorded twice: A 40 track drive stores the data on one group and an 80 track drive stores the same data on the other but with the same track numbers. But the catalogue is, as usual, at the start of the disc in track 0.

To read the data is easy. Just access the catalogue to tell the drive to read from the numbered tracks in the normal way – CHAIN"MENU", *RUN LOADER or whatever. The drive will go off to its own area of the disc – 40 or 80 track – and read the data held there without being aware that it is not reading from a perfectly ordinary disc.

The advantage is that the software company needs to produce only one disc to satisfy owners

00% 0
THE MAIN PALACE 1:0

*Palace of Magic*

of both types of drive. Chris Nixon's article in the April 1987 issue details how to format your own 40/80 discs.

The disadvantage of this method is that – because it splits the surface in two – the amount of space available for storing program code is drastically reduced and this becomes quite a problem when applied to compilations. A more efficient alternative to catering for both 40 and 80 track drives on the same disc is software double-stepping.

Most, but not all, modern 80 track drives have a switch on the back to force them to do this. An alternative is to have a loading routine on the disc that will force the drive to double-step if necessary. This solution is often used on commercial discs.

## Star bright

**Quazer** from Impact Software is the Archie's answer to FireTrack – a game that perfectly epitomises that tried and trusted maxim: "If it moves, kill it. If it doesn't move, shoot it 'til it does then kill it".

The game is divided into 11 sections, each of which can be accessed by entering a password. The full set is as follows:

| Level | Password |
|---|---|
| 1 | BLUEISLE |
| 2 | SPEAKER |
| 3 | LIGHT |
| 4 | MERCEDES |
| 5 | PHYSICS |
| 6 | KOJAK |
| 7 | ELECTRON |
| 8 | PLANT |
| 9 | BARBOUR |
| 10 | PIZZA |
| 11 | ROWER |

So now you can try out every level.

To give a rather over-simplified example, let's say that a disc has been formatted as a standard 40 track one. The game's loader attempts to read a particular track on the disc and if the disc is being used in the wrong type of drive an error is reported. From the presence or absence of this error the loader can determine whether the disc is in a 40 or 80 drive.

If an error is returned the loader now knows that it must double-step: Instead of moving one track in from its current position, it moves in two tracks. A jump of two tracks on an 80 track disc moves the head the same physical distance as moving from one track to the next on a 40 track disc. So the head will now be in position over the next track that contains data. To move to the following data track, the drive is then stepped in two more tracks, and so on until all the data has been read. It's easy, really.

This technique of software double-stepping has been used on all Superior's recent compilation discs, and also on a couple of stand-alone games such as Crazee Rider, where there is too much program code to fit on a dual format 40/80 disc. The routine is a short piece of machine code that goes by the name of INIT and is usually automatically installed by the command *INIT in the boot file or menu program.

Once activated, it effectively sits over the top of the disc filing system and forces the drive to double-step and try again whenever it encounters a disc read error. Kevin Edwards, the author of this routine, will be well known to many readers for his games Galaforce and the aforementioned Crazee Rider.

*Turn to Page 42* ▶

## Blast from the past

That old arcade blast Defender was great in its time and is still popular with old and new games players alike. Therefore I was not surprised when Minerva brought it to a new generation of afficionados.

**Orion** for the Archimedes is the latest incarnation of the old favourite. It has more colours and better graphics and sound effects, but underneath it all it's still the game that countless arcade aces have grown to know and love over the years.

Orion features a cheat mode. When asked to press space to start, press and hold down U, L, C and the spacebar. You will then be asked for the level on which you wish to start. You start on the specified level with 10 lives and the same number of smart bombs. However you no longer get the chance to enter your name on the high score table – instead your scores are entered automatically as *I'm a big cheat*.

02
03
Orion
00004000

*Orion*

SCORE
004070
MPH
POS
140
60
KS
D

*Crazee Rider*

◄ *From Page 41*

The original disc version of Palace of Magic was a dual-format 40/80 disc, and did not need software double-stepping. On the other hand, the 5.25in disc version of Play it Again Sam 3 is a 40 track disc with software double-stepping. The command *RUN :0.INIT is invoked on line 20 of the MENU program. Both INIT and MENU are stored on track zero, so that the double-stepping routine is already in operation before an 80 track drive has a chance to discover that it is not actually reading an 80 track disc.

All of which brings us back to the invulnerability routine for **Palace of Magic**. The routine I offered for the original game assumed a disc that did not require software double-stepping. The alternative routine on the right will provide total invulnerability when playing the Sam 3 version of the game, on either type of drive.

Good luck with the escape attempt. I've not yet seen the Compact version of Sam 3, but I will try to provide a routine for this version of Palace of Magic soon.

A final point: Once the theory is understood, these double-stepping routines are not as complex as they sound. They require no special knowledge of the disc controller and can be written easily using legal osword disc access calls.

The only rule to remember when developing routines of your own is that double-stepping is entirely software controlled and – with the exception of later Watford DFSs – is not a feature provided as standard by the disc filing system. Therefore the code that performs it must be present on the disc.

Without resorting to 40/80 formatting, the only track on an ordinary disc that appears identical to both 40 and 80 track drives is the outermost one – track zero. This means that your own double-stepping routine must be wholly contained on this track. DFS discs contain ten 256-byte sectors on each track, but the first two sectors on track zero are reserved for the disc catalogue. However, this still leaves eight sectors – more than enough for such a relatively simple task.

```
 10 REM Palace of Magic invulnerability
 20 REM for BBC Micro
 30 REM Play it again Sam 3 disc
 40 REM by Hac-Man
 50 REM (c) The Micro User
 60 FOR I%=0 TO 2 STEP 2:P%=&A00:[OPTI%
 70 LDA #96:STA &999:JSR &900
 80 LDA #&A9:STA &4661:LDA #0:STA &4662
 90 JMP &63A0
100 ]:NEXT:MODE 7:*FX15,0
110 PRINT"Please insert Palace of Magic
disc
and press any key...";:A%=GET
120 *RUN INIT
130 *LOAD POM2
140 CALL &A00
```

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# Micro with a mission

*Tony Jackson discovers the Electronic Missionary*

**THE gospel according to technology has always stressed that the micro is the message, the 20th century instrument of total communication. In a more traditional – and certainly Biblical – sense, the true Gospel has relied on pulpits, ancient script and the mouths of spiritual travellers whose mission was to spread the teachings of Christ.**

Imagine then, without being flippant, what may well have happened had St. Paul discovered a BBC Micro on the road to Damascus. Imagine the impact had the world's arguably single most important message – the Christian doctrine – had access at that time to an instant global communications network.

Today there is an Electronic Missionary and the word of Christ spills from two Masters, one BBC B with genlock and one Compact that make up the nerve centre of a charitable trust – Christian Video Ventures. And production director Richard Fairhead is quite happy to be known as a 21st century missionary.

A former BBC Television sound engineer at Pebble Mill, 31-year-old Richard now spreads the Christian teachings with video film and an assortment of literature via desktop publishing from his office in Birmingham.

"Five years ago while I was still at Pebble Mill I was asked to make a film to celebrate 75 years of the Diocese of Birmingham", he says. "A camera crew from the Mill helped out, and I realised the impact that technology could have on spreading Christianity".

His church – St. Stephen's and St. Wulstan's in Selly Park, Birmingham – also saw the potential, and a trust was set up to form Christian Video Ventures. He is supported financially by his church and is one of only two full-time staff members of the trust.

Initially, Richard used part of his own house and the homes of other volunteers to get the operation started, but recently they have taken over 2,500 square feet of one floor of the new Zion Pentecostal Church in Halesowen.

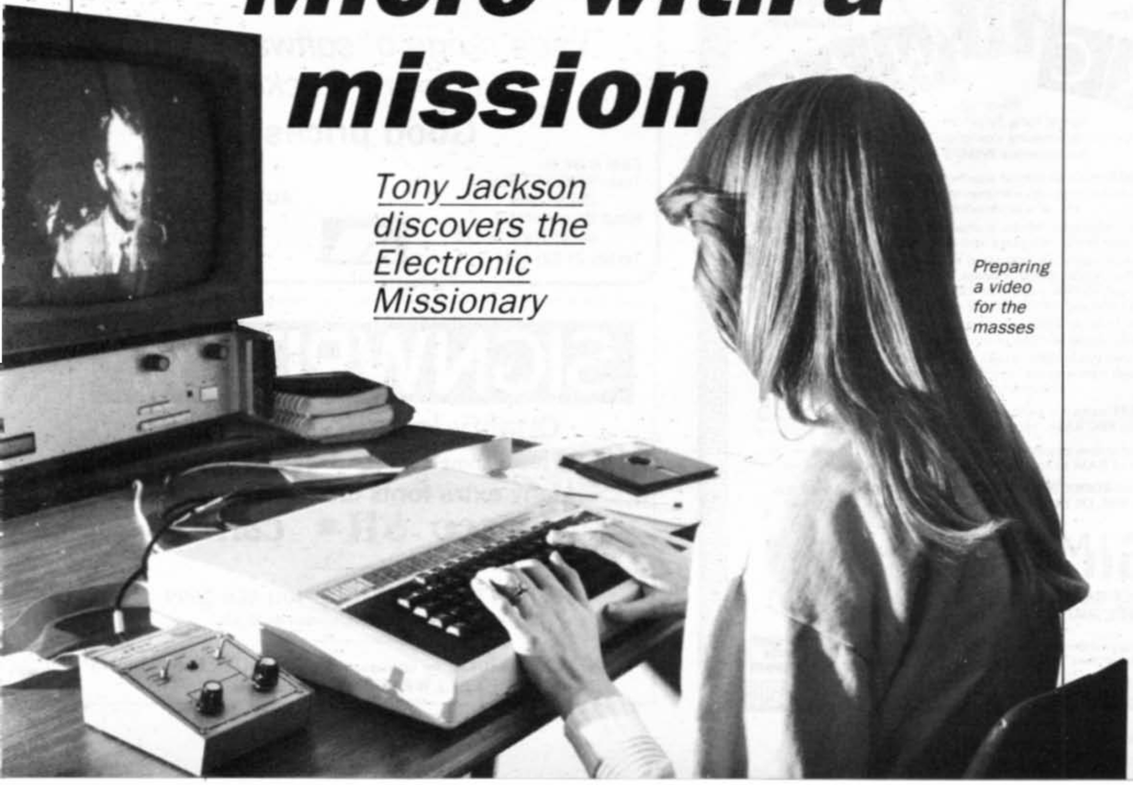
Making films was one thing, producing catalogues, cassette covers and newsletters was something else. That was where the micros came in. "We program the BBC B and Master using both Basic and 6502 assembler languages with associated System Delta database work", he says. "We expect to use Micro Trader programs for our distribution work and have also developed a system called Tapefax which synchronises a BBC Micro to a video tape but that needs further development work".

Meanwhile, Richard and the other full-timer – administrator of the trust Sue Sutcliffe – produce four four-page prayer letters each year with a print run of 1,000, plus 5,000 promotional leaflets and 500 inlay cards in both colour and black and white for their video cassettes.

"Our autumn prayer letter was photo-typeset on the Master with all commands embedded by ourselves", said Richard. "It was then sent down the phone to a local bureau for printing". All the material which they publish is available at the various Christian rallies and conventions which they are commissioned to film.

"We started off making video films", says Richard, "but got into desktop publishing to make the whole thing viable. We rely on commissions and donations". Christian Video Ventures

Turn to Page 44 ▶



Preparing a video for the masses

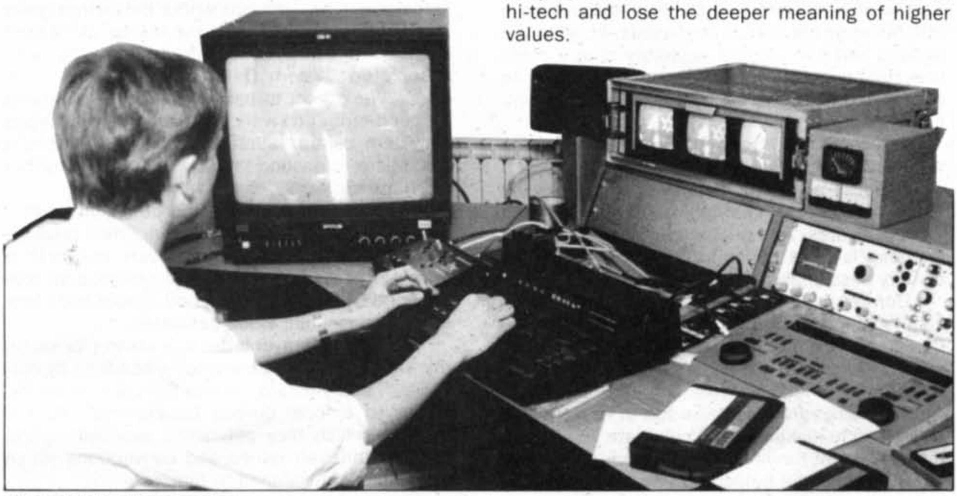
◀ From Page 43

produce approximately 500 tapes a year which are catalogued with the help of desktop publishing. The catalogue of VHS tapes then becomes part of their mailing operation.

Desktop publishing has allowed him the additional time to concentrate on his various filming projects. But despite the ease of technology, Richard is not unaware of the importance of the human factor.

"Eventually we will employ a full-time graphics designer", he says. "It is very easy to desktop publish but it might not look very good at the end of the day".

Surrounded by £60,000 worth of camera equipment and his micros, it is sometimes too easy to become sidetracked into the world of hi-tech and lose the deeper meaning of higher values.



*Richard Jack edits a concert*

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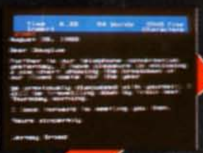
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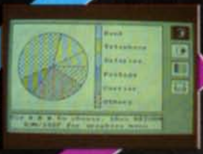
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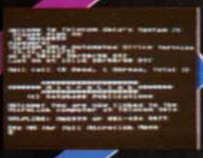
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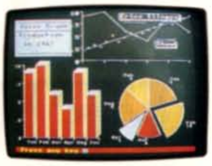
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# The Domino Effect

*Jon Perry brings about a collapse in your micro*

**BUILDING something up, whether it's a pile of children's blocks or a pack of cards, then knocking it down again can claim to be the oldest pastime ever. Not unlike this program, which is designed to simulate the art of toppling dominoes. It's the micro equivalent of an executive toy. A multitude of complex and colourful patterns can be woven into the screen and – at the press of a button – down they come and all your hard work disappears. Well, not quite, for with the press of a few more keys back they come.**

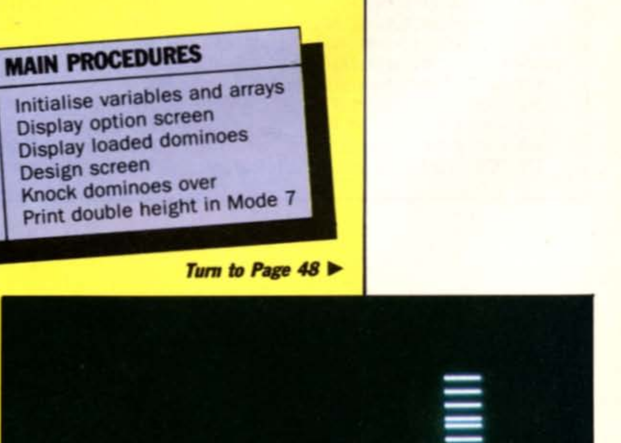
**Like many entertaining pastimes there's no real aim to this but it's good fun and and can keep you amused for hours. The keys you need to use are shown in the panel. So type in the listing, use the checksums to ensure it's correct and start knocking down dominoes.**

| MAIN VARIABLES | |
|---|---|
| P | Number of dominoes |
| PP | Loaded number of dominoes |
| H() | Palette selection |
| X(),Y() | Coordinates of domino |
| A() | Angle of domino |
| C() | Colour of domino |
| N() | Set if two dominoes on screen |
| s(),c() | Arrays for sine and cosine values |

| MAIN PROCEDURES | |
|---|---|
| init | Initialise variables and arrays |
| choose | Display option screen |
| disp | Display loaded dominoes |
| des | Design screen |
| topple | Knock dominoes over |
| db | Print double height in Mode 7 |

| Keys | Action |
|---|---|
| 1,2,3 | Change palette |
| Cursor up,down | Change delay |
| L | Load domino screen |
| Cursor keys | Move domino |
| C | Change colour |
| Space | Rotate domino |
| Shift | Speed up movement |
| N | Allow two dominoes at once |
| O | Cancel two dominoes |
| Return | Position domino |
| E | Finish screen |
| Spacebar/Return | Back to option screen |

Turn to Page 48 ►



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```
   10 REM DOMINOES
   20 REM by Jon Perry
   30 REM (c) The Micro User
   40 ONERRORMODE7:REPORT:PRINT" at ";ER
L:END
   50 PROCinit
   60 REPEATMODE7:VDU23,1,0;0;0;0;
   70 d=50:P=0:PP=0:PROCchoose
   80 MODE5:VDU23,1,0;0;0;0;
   90 FORI=0TO2:VDU19,I+1,H(I);0;:NEXT
  100 IFPP>P P=PP:PROCdisp
  110 PROCdes:PROCsave:PROCtopple
  120 REPEATUNTILINKEY-99ORINKEY-74
  130 UNTILFALSE
  140 DEFPROCchoose
  150 PROCdb(6,13,1,"DOMINOES")
  160 PROCdb(5,12,3,"________")
  170 PROCdb(7,5,15,"Delay")
  180 PRINTTAB(0,18)"File to load"
  190 PROCdb(1,0,22,"Press Shift when fi
nished....")
  200 REPEATPROCw(5):*FX15
  210 IFINKEY-49:H(0)=H(0)+1
  220 IFINKEY-50:H(1)=H(1)+1
  230 IFINKEY-18:H(2)=H(2)+1
  240 IFINKEY-58:IFd<200d=d+10
  250 IFINKEY-42:IFd>0d=d-10
  260 IFINKEY-87:PROCload
  270 FORI=0TO2:IFH(I)=8H(I)=1
  280 PROCdb(H(I),2,5+I*3,"Colour "+STR$
(I+1)):NEXT
  290 PROCdb(6,14,15,STR$d+"  ")
  300 UNTILINKEY-1:ENDPROC
  310 DEFPROCdb(C%,X%,Y%,M$):LOCAL D%
  320 FORD%=Y%TOY%+1:PRINTTAB(X%,D%)CHR$
141CHR$(128+C%)M$:NEXT:ENDPROC
  330 DEFPROCload:T$=FNip(15,18,7)
  340 PRINTTAB(15,18)SPC(7)
  350 X=OPENINT$:INPUT#X,PP
  360 FORI=0TOPP:FORJ=0TO1
  370 INPUT#X,x%(I,J),y%(I,J),a%(I,J),c%
(I,J):NEXT
  380 INPUT#X,n%(I):NEXT:CLOSE#X
  390 PROCdb(5,0,20,"File loaded : "+T$+
STRINGS$(7," ")):ENDPROC
  400 DEFPROCinit:DIM b%256:mx%=200
  410 DIMH(2):H(0)=1:H(1)=3:H(2)=7
  420 DIMx%(mx%,1),y%(mx%,1)
  430 DIMa%(mx%,1),c%(mx%,1)
  440 DIMs(24),c(24),n%(mx%)
  450 FORt=0TO360STEP15:s(t/15)=SINRADt:
c(t/15)=COSRADt:NEXT:ENDPROC
  460 DEFPROCdisp:FORI=0TOPP:FORJ=0TO1
  470 PROCline(I,J):NEXT:NEXT:ENDPROC
  480 DEFPROCdes
  490 C=1:x=640:y=200:a=0:N=1:n=0
  500 REPEATREPEATGCOL3,C
  510 FORI=0TO1:MOVEx,y:*FX19
  520 DRAWx+48*c(a),y+48*s(a):NEXT
  530 IFINKEY-1:J=24 ELSE J=12
  540 IFINKEY-58:IFy<964-J:y=y+J
  550 IFINKEY-42:IFy>112+J:y=y-J
  560 IFINKEY-26:IFx>64+J:x=x-J
  570 IFINKEY-122:IFx<1152-J:x=x+J
  580 IFINKEY-99:a=a+.5:IFa=25 a=0
  590 IFINKEY-83:C=C+1:IFC=4 C=1
  600 IFINKEY-86:N=2:SOUND1,-10,200,1
  610 IFINKEY-55:IFn=0:N=1:SOUND1,-10,10
0,1
  620 UNTILINKEY-74 OR INKEY-35 ORP>mx%
  630 IFP>mx% GOTO720
  640 SOUND1,-15,100,1:a=INTa:C=INTC
  650 IFINKEY-35 GOTO720
  660 IFn=1 GOTO700
  670 x%(P,0)=x:y%(P,0)=y
  680 a%(P,0)=a:c%(P,0)=C:PROCline(P,0)
  690 IFN=2:n%(P)=1:IFn=0 n=1:GOTO720
  700 IFn=1:x%(P,1)=x:y%(P,1)=y:a%(P,1)=
a:c%(P,1)=C:PROCline(P,1):P=P+1:n=0:GOTO
720
  710 IFN=1:P=P+1:GOTO720
  720 UNTILINKEY-35 ORP>mx%
  730 PP=P-1:ENDPROC
  740 DEFPROCline(n%,m%):GCOL0,c%(n%,m%)
  750 xx=x%(n%,m%):yy=y%(n%,m%)
  760 MOVExx,yy:DRAWxx+48*c(a%(n%,m%)),y
y+48*s(a%(n%,m%)):ENDPROC
  770 DEFPROCtopple
  780 FORI=0TOP:PROCbox(I,0)
  790 SOUND1,-10,I,1:SOUND1,0,0,0
  800 IFn%(I)=1 PROCbox(I,1):SOUND2,-10,
I+4,1:SOUND2,0,0,0
  810 PROCw(d):NEXT
  820 FORI=P TO0STEP-4:SOUND1,-10,I,1:SO
UND1,0,0,0:NEXT:ENDPROC
  830 DEFPROCbox(n%,m%):aa=a%(n%,m%)
  840 ab=aa+6:IFab>24 ab=ab-24
  850 GCOL0,c%(n%,m%):xx=x%(n%,m%)
  860 yy=y%(n%,m%):MOVExx,yy
  870 MOVExx+48*c(aa),yy+48*s(aa)
  880 PLOT85,xx+16*c(ab),yy+16*s(ab)
  890 PLOT85,xx+48*c(aa)+16*c(ab),yy+48*
s(aa)+16*s(ab):ENDPROC
  900 DEFPROCsave:*FX4,1
  910 PRINTTAB(0,30)"Save ?(Y/N)"
  920 PROCw(20):IF NOTFNyn THEN990
  930 PRINTTAB(0,30)STRING$(7,".")SPC4
  940 T$=FNip(0,30,7)
  950 X=OPENOUTT$:PRINT#X,PP
  960 FORI=0TOPP:FORJ=0TO1
  970 PRINT#X,x%(I,J),y%(I,J),a%(I,J),c%
(I,J):NEXT
  980 PRINT#X,n%(I):NEXT:CLOSE#X
  990 PRINTTAB(0,30)SPC11:ENDPROC
 1000 DEFFNip(X%,Y%,L%):P%=0:*FX15
 1010 PRINTTAB(X%,Y%)STRING$(L%,".")TAB(
X%,Y%);
 1020 REPEATb%?P%=13:A%=GET
 1030 IFP%IFA%=127P%=P%-1:VDUA%ASC".";8
 1040 IFP%<L%IFA%>32IFA%<127b%?P%=A%:VDU
A%:P%=P%+1
 1050 UNTILA%=13:=$b%
 1060 DEFFNyn:REPEATA%=GETAND&DF
 1070 UNTILA%=ASC"Y"ORA%=ASC"N"
 1080 =(A%=(ASC"Y"))
 1090 DEFPROCw(T%):T%=TIME+T%
 1100 REPEATUNTILTIME>T%:ENDPROC
```

## Get it right!

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 6899 9
  50 = DEBB 2
  60 = B3E9 7
  70 = 3B7D 4
  80 = E8B6 6
  90 = 6198 E
 100 = D6CF 8
 110 = D70A 1
 120 = 3A26 0
 130 = E014 3
 140 = FE9C 7
 150 = B723 F
 160 = 3160 A
 170 = C004 3
 180 = D4AB E
 190 = 18DD 4
 200 = BDB7 4
 210 =  549 C
 220 = AD86 B
 230 = EDE1 2
 240 = 7C95 1
 250 = ACF3 9
 260 = 66E6 C
 270 = 333A 0
 280 = B2A9 6
 290 = 7A5C 0
 300 = C312 D
 310 = 9756 E
 320 = F965 7
 330 = BC57 F
 340 = C6B7 2
 350 = 81B8 F
 360 = D69C 2
 370 = 48F0 A
 380 = 4D7B 3
 390 = F3FD C
 400 = 78BB C
 410 = 5F78 E
 420 = E05B 1
 430 = 2241 D
 440 = 1F45 B
 450 = 52BA C
 460 = D42F D
 470 = BF67 0
 480 = 993D 3
 490 = E4E8 E
 500 = CA16 C
 510 = CFFE C
 520 = 1BE4 F
 530 = B7F8 5
 540 = 9ACA 7
 550 = 13BF 5
 560 = D019 7
 570 = C221 6
 580 = 8B61 C
 590 = DD9F 1
 600 = 5C9F 2
 610 = C135 2
 620 = 463A 9
 630 = 6363 F
 640 = 490A 0
 650 = 5F0D 6
 660 = 2148 9
 670 = 69A9 9
 680 = EBDA A
 690 = FCD9 A
 700 = DA82 C
 710 = 7DD2 D
 720 = 84D5 6
 730 = AE02 8
 740 = 962C A
 750 = E4A4 1
 760 = 591A 1
 770 = F8DB 5
 780 = 3186 8
 790 = 39DC 2
 800 = CAB6 2
 810 = 8596 6
 820 = 8A64 D
 830 = 8D8C 2
 840 = BB09 0
 850 = 2880 B
 860 = FDD8 D
 870 = C4B2 4
 880 = E664 F
 890 = 9260 D
 900 =   84 E
 910 = 70C0 7
 920 = 5EA1 4
 930 = 1D4E A
 940 = D56B B
 950 = EAD3 B
 960 = D69C 4
 970 = DB5B 6
 980 = 8A48 A
 990 = 967F E
1000 = FC72 2
1010 = D9B7 8
1020 = C76A A
1030 = D998 E
1040 = 29FC 1
1050 = D849 9
1060 = FF41 4
1070 = 93E3 8
1080 = 498C 2
1090 = 2493 B
1100 = 5D4E E
```

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| | | |
|---|---|---|
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|---|---|---|
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|---|---|---|
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|---|---|---|
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# Z88 AND PSION ORGANISER

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|---|---|---|---|
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Using surface mounted components and ultra-miniature technologies, a complete I/O system for the Archimedes has been created to fit into a half-height Eurocard. Yet the price of the complete podule is under half the price of many single feature podules.

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Video digitiser for use with stationary picture sources (5 second scan in MODE 15). Ideal for video-recorders and cameras. This digitises to 256 levels of grey, colour is provided as an extra with breakout box which will be available soon.

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A full RS232 interface is provided with all modem control lines, onto a standard 25 way D connector. +−10 V levels are used to drive the RS232 lines.

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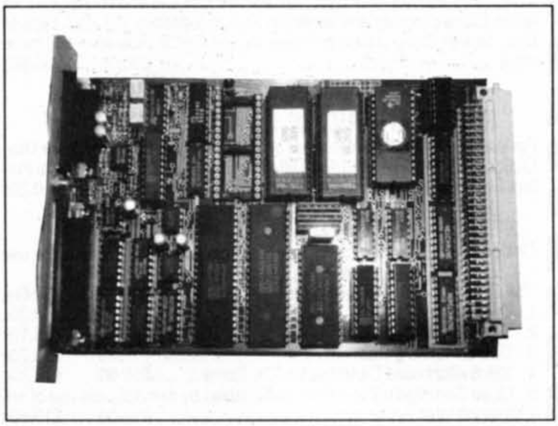
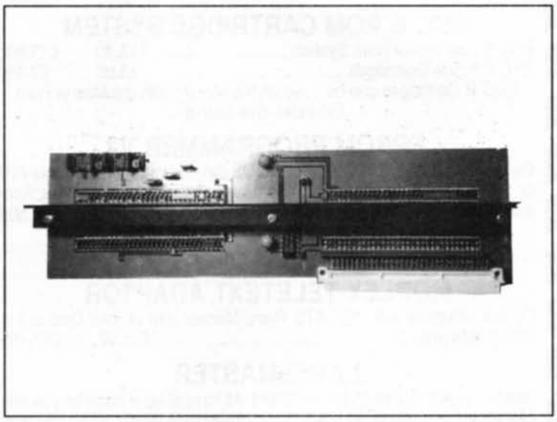
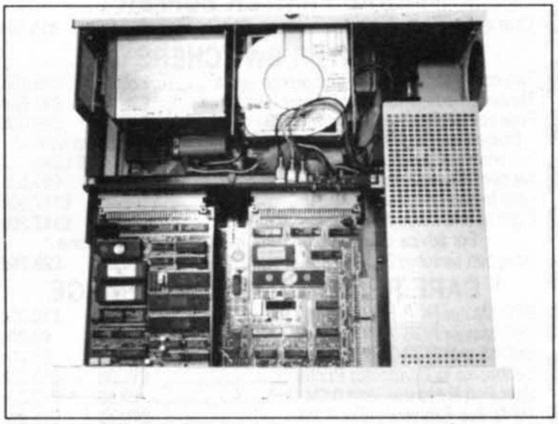
A single Dual channel joystick can be inserted and used with the standard 15 way D connector.

**ROM SOCKETS**
Rom sockets are provided which can accept up to 3 roms, each of which can be up to 128k in size. Software provides for a complete ROM filing system with a fast RAM filing system. The ROM sockets provided are turned pin ultra-hi reliability for long term performance.

Software for the above features is provided on the board, this includes a complete range of SWI's, and star commands.
Price £107 (This includes V1.0 software)







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A product designed to interface the Archimedes RGB output to composite monitors and video recorders.
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# It's electronically on the cards...

*Keep your addresses on disc with the help of Frank McGreal*

**ALTHOUGH there are a lot of sophisticated database programs around for the BBC Micro sometimes all you need is something simple on which to keep names and addresses plus, perhaps, some notes. Here is just such a program which squeezes effective database functions into a small space. You can enter, amend and delete entries as well as browse, sort, print and search.**

All the information is held on disc so it's best to Keep only the Card Index program and the data file there. This arrangement will ensure that you don't get the dreaded *Can't extend* error.

Data entry is simple: Enter the data as requested using Return for any empty fields. When you have finished the program displays the new record, and if you've made a mistake you can re-enter the data.

When the new information is confirmed as correct you are immediately presented with the opportunity to enter another record. Press Return to go back to the main menu.

All new records are added at the end of the disc file, so will be out of order initially. To arrange data alphabetically you should use the sort option after entering new information. For simplicity the sort only operates on the first field and is case sensitive.

The record number is required when altering existing data, but remember that this value is likely to change every time a deletion or sort is carried out. Amending data follows the same procedure.

You need the record number again when deleting data – the record is displayed and the usual Y/N confirmation is requested.

Printing assumes continuous stationery with labels two across although this can be changed by altering some variables – see adjoining panel.

The search option really extends the power of Card Index. You are asked which fields are to be searched and enter the relevant string to search for. The program performs the check, keeping a list of which records match. On completion you are returned to the main menu.

Now, however, the browse and print options operate only on the selected records which you can check through or print. To cancel, enter search again and press Escape.

When run the program checks the disc for a data file, and if it doesn't find one asks if you want to create one – you could change discs at this point instead. New files are initialised with a default number of cards which should be altered once you are happy the program is running correctly.

So type it in, ensure you've made no errors with the checksums and then save it and you're ready to go.

```
10 REM Card Index
20 REM by Frank McGreal
30 REM (c) The Micro User
40 MODE7:PROCinit
50 ON ERROR PROCerror
60 REPEAT X%=FNmenu
70 IF X%=1 PROCbrowse
80 IF X%=2 PROCenter
90 IF X%=3 PROCsrch
```

Turn to Page 119 ▶

## CUSTOMISING THE CARD INDEX

You can change the field names and sizes simply by altering the data statements in lines 1930 to 2010. The value in the first statement is the total number of fields used and should be altered as necessary.

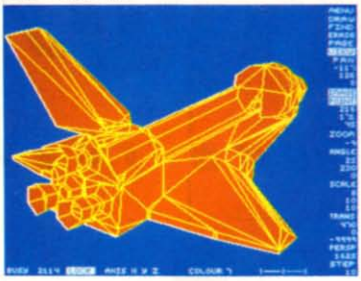
Any change to the field sizes which alters the overall record size – calculated in line 1830 – will make any old data files incompatible with the new program, so it's advisable to keep the program and its associated data file on one disc.

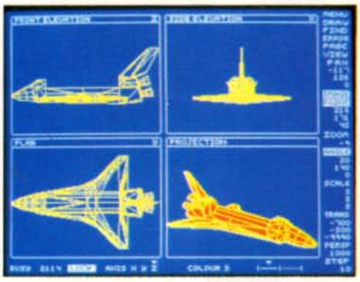
The label output can be controlled quite accurately by altering the variables shown on the following page.

# SILICON VISION

## SOFTWARE FOR THE ARCHIMEDES & BBC

### SolidCAD





The ultimate 3D Draughting System for Architectural design, Interior design, Engineering Design and Teaching CDT. Allows drawing in plan, front & side elevations and also directly in 3D view. Includes powerful zoom & pan options for precision draughting and surface definition for creating solid colour objects. Also includes Sweep, Extrude & Macro facilities for designing very complex objects easily. Designs created with SolidCAD are compatible with the Realtime Graphics Language for high-speed flicker-free animation. The custom Archimedes version also performs smooth shading for realism. SolidCAD(Arc) users can upgrade to the Realtime Solids Modeller (Arc) for £40.00.

£49.95 (ARC or BBC B/B+/Master), New

### REALTIME SOLIDS MODELLER

The package includes both the sophisticated design environment of SolidCAD and the high speed animation capability of a Realtime Graphics Language (RGL) module developed in pure ARM Risc code for supercharged performance. The package is ideal for Architectural design, Interior design, Engineering design & teaching CDT. The RGL module can be used to create standalone flicker-free animation of designs from your own programs. Smooth shading is also performed for realistic images. Through our in-house expertise in 3D Design and High-speed techniques, no other package can rival the design environment & animation speed of the Realtime Solids Modeller.

£89.95 (ARC) New

### REALTIME GRAPHICS LANGUAGE

The Realtime Graphics Language rom provides a complete 3D Solids/Wireframe animation system with 52 star commands and 3D Editors for designing objects to animate from your own programs. Includes a 35,000 pixels / sec line generator for fast 3D drawing rates, 3D Rotate, Scale, Orbit, Perspective and Turtlegraphics. Also compatible with designs created with SolidCAD (BBC).

£49.95 (BBC B/B+/Master)

### SUPER-DUMP

The ultimate printer driver which takes advantage of the highest resolution capability of ordinary Epson compatible printers to provide 1920 × 1024 resolution. Images can also be scaled, positioned and previewed before printing. Fully compatible with SolidCAD, Realtime Graphics Language, Gate-Array design system & 3D CAD/Animation system. Your own graphics programs or other CAD packages can be made compatible with Super-Dump by the addition of a few simple commands. An example program is included in the package.

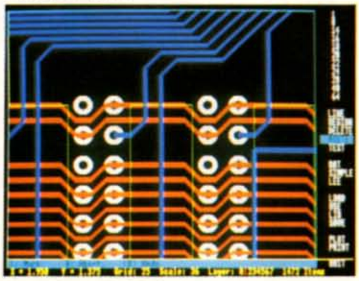
£15.95 (BBC B/B+/Master), £24.95 (ARC) New

### Presentation System

The package provides an interactive environment to create, edit and play-back computer controlled presentations for lectures and demonstrations. Also handles graph plotting for polynomials & user-defined functions which can be incorporated within the presentations.

£34.95 (BBC B/B+/Master), £49.95 (ARC) New

### ARC-PCB



**The ultimate PCB design system developed specifically for the Archimedes with a specification that cannot be matched. Includes Automatic routing, Rats-nesting, 8 layers, Surface mount capability, 0.001" resolution, 32" × 32" maximum board size, On-line Help, Fast Zoom/Pan/Redraw, Text & Silkscreen facility, Variable Line/Pad/Text/Grid sizes, Part Libraries, Block Move/Copy/Rotate/Mirror/Erase options, and up to 300,000 components.**

For hardcopy, the system supports the industry standard HP-GL, GRAPHTEC, PLOTMATE plotters and printers at their highest resolutions. Also provides automatic drilling information with extensive support from PCB manufacturers for final layout and production, optional 1 year telephone Hotline support (£100) and software maintenance service (£75) is also available.

£195.00 (ARC) New

### Risc BASIC

The first true BASIC V syntax compiler which will convert your programs into supercharged Risc code for turbo performance leaving the competition standing. Features include Relocatable modules, full cross references, Double precision floating point & Integer support, in-line assembly, Window-based or command line compilation environment, standalone code generator, object code optimiser, full array manipulation and dimensions support, multiple exit structures & full runtime error handler.

£99.95 (ARC) New

### RiscFORTH

**A new 32-bit implementation of the FORTH-83 standard, designed to take full advantage of the ARM architecture. Features include Multi-tasking, Optimising compiler, built-in ARM assembler with floating point mnemonics, built-in Full screen Editor, File system interface, OS calls support, Floating point & Integer maths, WIMP support, Single-step debugger, Shadow screen for documentation, Block manipulation, Dictionary & Vocabulary display, Call finding and a standalone code generator.**

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**All Archimedes software run in native mode on A305 – A440**

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# Bet you can't follow that...

James Ramsay presents an addictive test of memory

**ONE of the first electronic games to tax our minds was Simon. All you had to do was memorise the sequence of lights that flashed and repeat it. It wasn't as easy as it sounds. Now, we present an enhanced version of this fascinating game for your Z88.**

The micro flashes panels on its display at random and you hit corresponding keys in the correct order when prompted – the faster you do this the more you score.

There are four skill levels – the hardest is level one – and the highest score to date is recorded and displayed. You start with three lives and lose one for each sequence you get wrong – to win the game you must get five sequences in order. It may sound easy, but you'll find it quite tricky and very compelling.

```
  10 REM Follow Me
  20 REM by James Ramsay
  30 REM (c) The Micro User
  40 H%=0:DIM A$(4):REPEAT
  50 PROCvariables:PROCcharacters
  60 PROCinitiate:PROCwindows:PROCsetup
  70 REPEAT
  80 PROCstatus:PROCcontinue
  90 PROCsequence:PROCstart
 100 PROCshow:PROCanswer:PROCupdate
 110 UNTIL L%=0 OR R%=5
 120 VDU 1,ASC("2"),ASC("H"),ASC("1")
 130 CLS:IF R%=5 PROCwin ELSE PROClose
 140 PROCagain
 150 UNTIL FALSE
 160 DEFPROCanswer
 170 LOCAL A,X:VDU1,66
 180 VDU1,ASC("2"),ASC("H"),ASC("1")
 190 PRINTTAB(29,1);"What do you think
the sequence was?";
 200 PROCdelay(1000)
 210 PRINTTAB(0,1);STRING$(93," ");TAB(
36,1);"Type your answer now!";
 220 PROCdelay(1000)
 230 PRINTTAB(0,1);STRING$(93," ");
 240 Z$="":TIME=0
 250 REPEAT
 260 A$=INKEY$(0)
 270 IF ASC(A$)>56 OR ASC(A$)<53 THEN 2
60 ELSE VDU1,132,ASC"!",34,35,35
 280 IF LEN(A$)>1 A$=LEFT$(A$,1)
 290 T%=TIME
 300  A=6-(57-ASC(A$)):VDU1,ASC("2"),AS
C("H"),ASC(STR$(A))
 310 VDU1,ASC("2"),ASC("G"),ASC("-"):PR
OCdelay(200):VDU1,ASC("2"),ASC("G"),ASC(
"+")
 320 VDU1,ASC("2"),ASC("H"),ASC("1")
 330 TIME=T%:Z$=Z$+A$:X=LEN(Z$)
 340 UNTIL X=C%
 350 A$=Z$:Z$="":FOR X=1 TO C%
 360 A=VAL(MID$(A$,X,1)):A=A-3:Z$=Z$+ST
R$(A):NEXT X
 370 T%=TIME
 380 IF Z$=C$ PROCcorrect ELSEPROCwrong
 390 ENDPROC
 400 DEFPROCcharacters
 410 VDU 1,138,ASC"=",ASC"A",191,191,19
1,191,191,191,191,191
 420 VDU 1,138,ASC"=",ASC"B",170,149,17
0,149,170,149,170,149
 430 VDU 1,138,ASC"=",ASC"C",191,191,19
1,179,179,191,191,191
 440 VDU1,138,ASC"=",ASC"D",128,128,129
,130,132,168,144,128
 450 A$(1)=STRING$(13,(CHR$(1)+CHR$(130
)+"?"+"A"))
 460 A$(2)=STRING$(13,(CHR$(1)+CHR$(130
)+"?"+"B"))
 470 A$(3)=STRING$(13,(CHR$(1)+CHR$(130
)+"?"+"C"))
 480 A$(4)=STRING$(13,"*")
 490 R$=CHR$(1)+CHR$(130)+"?"+"D"
 500 ENDPROC
 510 DEFPROCvariables
 520 S%=0:L%=3:R%=0:W%=0
 530 ENDPROC
 540 DEFPROCsetup
 550 A=1:REPEAT
 560 VDU 1,ASC("2"),ASC("I"),ASC(STR$A)
 570 PROCfill(A)
 580 VDU 1,ASC("2"),ASC("G"),ASC("+")
 590 A=A+1:UNTIL A=6
 600 VDU 1,ASC("2"),ASC("H"),ASC("1")
 610 VDU1,66:PRINTTAB(3,2);"SCORE"TAB(3
,3)"00000"TAB(3,6)"LIVES"TAB(5,7);L%;
 620 PRINTTAB(84,2);"RIGHT";TAB(84,6);"
WRONG";:VDU1,66
 630 ENDPROC
 640 DEFPROCstatus
 650 VDU1,ASC("2"),ASC("H"),ASC("1")
 660 VDU1,82,1,84
 670 PRINTTAB(0,0);STRING$(93," ");
 680 PRINTTAB(2,0);"HI-SCORE: ";H%;
 690 C%=RND(-TIME):C%=RND(5+(4-U%))+1
 700 PRINT TAB(26,0);"The following seq
uence has ";C%;" components."
 710 VDU1,82:VDU1,84
 720 ENDPROC
 730 DEFPROCshow:LOCAL A$,A:A=1
 740 REPEAT
 750 A$=MID$(C$,A,1)
 760 VDU 1,ASC("2"),ASC("H"),ASC(A$)
 770 VDU 1,ASC("2"),ASC("G"),ASC("-")
 780 PROCdelay(M%)
 790 VDU 1,ASC("2"),ASC("G"),ASC("+")
 800 A=A+1
 810 PROCdelay(10)
 820 UNTIL A=(LEN(C$)+1)
 830 ENDPROC
 840 DEFPROCfill(A)
 850 LOCAL B,C,B$
 860 FOR B=1 TO 5
 870 PRINTTAB(0,B);A$(A-1);
 880 NEXT B
 890 IF A=1 THEN 920
 900 VDU1,82:B$=STR$(A+3):PRINT TAB(0,0
);"    KEY ";B$;"     ";
 910 VDU1,82
 920 ENDPROC
 930 DEFPROCupdate
 940 LOCAL S$
 950 S$=STR$(S%)
 960 VDU1,66:PRINTTAB(8-(LEN(S$)),3)S$;
```

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◀ From Page 53

```
 970 PRINTTAB(5,7);L%;:VDU1,66
 980 ENDPROC
 990 DEFPROCdelay(A):LOCAL B
1000 FOR B=1 TO A:NEXTB
1010 ENDPROC
1020 DEFPROCsequence
1030 LOCAL A,B,C:B=RND(-TIME)
1040 C$="":A=1:C=0
1050 REPEAT
1060 B=RND(4):B=B+1
1070 IF C=B THEN 1060
1080 C=B:C$=C$+STR$(B):A=A+1
1090 UNTIL A=C%+1
1100 ENDPROC
1110 DEFPROCstart:VDU1,66
1120 PRINTTAB(44,1);"READY"
1130 PROCdelay(400)
1140 PRINTTAB(44,1);"STEADY"
1150 PROCdelay(400)
1160 PRINTTAB(44,1)SPC6TAB(45,1)"GO!";
1170 PROCdelay(400)
1180 PRINTTAB(44,1)SPC6:VDU1,66
1190 ENDPROC
1200 DEFPROCwin
1210 VDU1,66:VDU1,70:PRINTTAB(36,2);"We
ll done you have won!";:VDU1,70:VDU1,66
 1220 S%=S%+(L%*100)
 1230 IF S%>H% H%=S%
 1240 PRINTTAB(38,4);"You scored: ";S%;
 1250 ENDPROC
 1260 DEFPROClose
 1270 VDU1,66:PRINTTAB(38,2);"Sorry,you
have lost";:VDU1,66
 1280 ENDPROC
 1290 DEFPROCcorrect:R%=R%+1
 1300 PRINTTAB((83+R%),3);R$;:PROCscore
 1310 ENDPROC
 1320 DEFPROCwrong
 1330 W%=W%+1:L%=L%-1
 1340 PRINTTAB((84+W%),7);"x";
 1350 ENDPROC
 1360 DEFPROCscore
 1370 S%=S%+(C%*10)
 1380 S%=S%+(1000-(T% DIV 10))
 1390 ENDPROC
 1400 DEFPROCcontinue
 1410 PRINTTAB(31,1);" Press space for n
ext sequence "
 1420 REPEAT UNTIL GET=32
 1430 PRINTTAB(0,1);STRING$(93," ")
 1440 ENDPROC
 1450 DEFPROCinitiate:LOCAL A
 1460 CLS:VDU1,84:VDU1,85:PRINTTAB(42,1)
;"FOLLOW ME!":VDU1,85
 1470 PRINTTAB(37,3);"By James Paul Rams
ay"
 1480 PRINTTAB(35,5);"Which skill level
(1-4)";
 1490 A=GET-48:U%=A
 1500 IF A>4 OR A<1 PRINTTAB(0,5);STRING
$(93," ");:GOTO 1480 ELSE M%=200+(A*150)
 1510 PRINTTAB(35,7);"Press space to sta
rt";:REPEAT UNTIL GET=32
 1520 ENDPROC
 1530 DEFPROCagain
 1540 PRINT TAB(33,7);"Do you want anoth
er go (Y/N)";
 1550 G$=GET$
 1560 IF G$="Y" OR G$="y" THEN 1590
 1570 IF G$<>"N" AND G$<>"n" THEN 1550
 1580 CLS:PRINT "BYE":END
 1590 ENDPROC
 1610 DEFPROCwindows
 1620 VDU 1,ASC("7"),ASC("#"),ASC("1"),3
2,32,125,40,130
 1630 VDU 1,ASC("7"),ASC("#"),ASC("2"),4
6,34,45,38,130
 1640 VDU 1,ASC("7"),ASC("#"),ASC("3"),6
3,34,45,38,130
 1650 VDU 1,ASC("7"),ASC("#"),ASC("4"),8
0,34,45,38,130
 1660 VDU 1,ASC("7"),ASC("#"),ASC("5"),9
7,34,45,38,130
 1670ENDPROC
```

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# It sounds like ...

### Carl Dunkley shows how to get away with fuzzy spellings

**QUIZZES and databases have one thing in common – the need to match one string against another when searching. But micros are very literal-minded and *CROSS* is – it thinks – completely different from *Kross*. Case sensitivity is easy to handle, but here's a technique that matches words that sound alike. It's called Soundex and encodes the components of words that sound similar to the same numeric value and then compares the results.**

These are the groups that are used:

| Group | Letters |
|---|---|
| 1 | B,F,P,V |
| 2 | C,G,J,K,Q,S,X,Z |
| 3 | D,T |
| 4 | L |
| 5 | M,N |
| 6 | R |
| 0 | All others, including non-alphabetic |

There are three stages to the process:

- Replace each character in the string with its corresponding group code, for example Pascal becomes 102204.
- Pairs of digits that are the same are replaced by a single one, so 102204 becomes 10204.
- Finally all the zeroes are stripped to leave the final code, in our Pascal example: 124.

If we apply the same technique to Passkull we get the following for the three steps:

10222044
10204
124

so according to the Soundex system Pascal is equivalent to Passkull.

The listing gives a machine code routine that produces the Soundex code for any string. To use it install the three routines PROCassemble, FNsndx and FNlo within your own program, make sure the first is run within your initialisation procedure and call the others as required.

The program given also contains a demonstration routine in the form of a mini quiz which asks a number of questions and compares your answer with the correct one using the Soundex system. You get up to three goes if your answer is similar but incorrect.

One point to note is that it is very important that – within the Basic part of the program – the two strings to be compared are set to lower case. The *sndx* routine itself converts its input string to lower case too.

So type it in, use Get it Right! and experiment with words that are spelt almost correctly.

```
 10 REM Soundex
 20 REM by Carl Dunkley
 30 REM (c) The Micro User
 40 MODE7
 50 PROCassemble
 60 PROCdemo
 70 END
 80 :
 90 DEF PROCdemo
100 LOCAL C%:RESTORE 520:READ Q%
110 FOR N%=1 TO Q%:CLS:try=0
120 PRINTTAB(12,0)CHR$141"Soundex"
130 PRINTTAB(12,1)CHR$141"Soundex"
140 PRINTTAB(0,4)"Question No.:";N%
150 PRINTTAB(0,5)"No. correct :";C%
160 READ q$,j$:a$=FNlo(j$)
170 PRINTTAB(0,11)q$
180 REPEAT try=try+1
190 PRINTTAB(0,14)SPC240
200 PRINTTAB(0,9)"No. of tries:";try
210 INPUTTAB(0,14)"Answer:"c$
220 c$=FNlo(c$):UNTIL FNright OR try=3
230 NEXT:PROCresults:ENDPROC
240 :
250 DEF FNright:Y%=16
260 IF c$=a$ PROCcorrect:=TRUE
270 IF try<3 IF FNsndx(c$)=FNsndx(a$)
PROCtry_again:=FALSE
280 PROCwrong:=TRUE
290 :
300 DEF PROCspace
310 PRINTTAB(0,19)"Press space...";
```

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```
  320 REPEAT UNTIL GET=32:ENDPROC
  330 :
  340 DEF PROCresults
  350 PRINTTAB(0,22)STRING$(40,"-");
  360 PRINTTAB(0,23)"You scored ";C%" ou
t of ";Q%
  370 ENDPROC
  380 :
  390 DEF PROCcorrect
  400 PRINTTAB(0,Y%)"That is correct!"
  410 C%=C%+1:PROCspace:ENDPROC
  420 :
  430 DEF PROCtry_again
  440 PRINTTAB(0,Y%)"Sounds like that, t
ry again..."
  450 PROCspace:ENDPROC
  460 :
  470 DEF PROCwrong
  480 PRINTTAB(0,Y%)"That is wrong!"
  490 PRINTTAB(0,Y%+2)"The answer is "j$
  500 PROCspace:ENDPROC
  510 :
  520 DATA 6
  530 DATA What is measured in watts,pow
er
  540 DATA What is the measurement unit
of current,ampere
  550 DATA What force makes a body move
in a circular path,centripetal
  560 DATA What is Kg an abbreviation fo
r,kilogram
  570 DATA What is the device used to st
ep up or down voltages,transformer
  580 DATA Who wrote the song 'Wow'?,Kat
e Bush
  590 :
  600 --------------------------------
  610 :
  620 DEF FNlo($str):LOCAL C%,L%
  630 FOR L%=0 TO LEN$str-1:C%=str?L%
  640 IF C%>64 IF C%<91 str?L%=C%+32
  650 NEXT:=$str
  660 :
  670 DEFFNsndx($str):CALLsndx:=$str
  680 :
  690 DEFPROCassemble
  700 code=&C00
  710 DIM str 256
  720 FOR L%=0 TO 2 STEP 2
  730 P%=code:[OPT L%
  740 .sndx
  750  LDY #0
  760 .loop1
  770  LDA str,Y
  780  CMP #13
  790  BEQ remove_pairs
  800  ORA #32
  810  LDX #35
  820 .loop2
  830  CMP table,X
  840  BNE not_found
  850  LDA table-1,X
  860  JMP set_code
  870 .not_found
  880  DEX
  890  DEX
  900  BPL loop2
  910  LDA #48
  920 .set_code
  930  STA str,Y
  940  INX
  950  INY
  960  JMP loop1
  970 .remove_pairs
  980  LDY #0
  990  LDX #0
 1000 .loop3
 1010  LDA str,Y
 1020  CMP #13
 1030  BEQ remove_zeroes
 1040  CMP str+1,Y
 1050  BNE nomatch
 1060  INY
 1070  JMP loop3
 1080 .nomatch
 1090  INY
 1100  STA str,X
 1110  INX
 1120  JMP loop3
 1130 .remove_zeroes
 1140  STA str,X
 1150  LDY #0
 1160  LDX #0
 1170 .loop4
 1180  LDA str,Y
 1190  CMP #13
 1200  BEQ end
 1210  CMP #48
 1220  BNE not_zero
 1230  INY
 1240  JMP loop4
 1250 .not_zero
 1260  STA str,X
 1270  INX
 1280  INY
 1290  JMP loop4
 1300 .end
 1310  STA str,X
 1320  RTS
 1330 \
 1340 .table:]:NEXT
 1350 RESTORE 1420
 1360 READ noofgrps
 1370 FOR N%=1 TO noofgrps:READ A$
 1380 FOR M%=1 TO LENA$:?P%=N%
 1390 P%?1=ASCMID$(A$,M%):P%=P%+2
 1400 NEXT:NEXT:ENDPROC
 1410 :
 1420 DATA 6,bfpv,cgjkqsxz,dt,l,mn,r
```

**Get it right!**

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 8AFC C
  50 = 126A A
  60 = 7852 E
  70 = FD2E E
  80 = 9719 1
  90 = E63E 4
 100 = A8F2 F
 110 = DC4D 2
 120 = 12BD E
 130 = BC41 1
 140 = 1BBE 4
 150 = 6CB3 B
 160 = 31EF 7
 170 = 4FEA B
 180 = C5AD 7
 190 = 16D8 A
 200 = E43B F
 210 = C8BB E
 220 = 74A0 1
 230 = 7AB3 0
 240 = 9719 3
 250 = A159 1
 260 = F206 4
 270 = 6E0B 4
 280 = 4257 3
 290 = 9719 3
 300 = 6B8B F
 310 = 768F 1
 320 = BF3A C
 330 = 9719 0
 340 = 7EC8 0
 350 = D0EB 5
 360 = E031 F
 370 = ED0F F
 380 = 9719 7
 390 = F83E 2
 400 = 1E25 C
 410 = 7B8B 4
 420 = 9719 1
 430 = 23AA A
 440 = 3B08 8
 450 = DD1D 4
 460 = 9719 C
 470 = 42FA F
 480 = 5A6E 4
 490 =  5C2 7
 500 = DD1D 0
 510 = 9719 F
 520 = 4086 9
 530 = C837 B
 540 = 7514 A
 550 = 31B1 F
 560 = 2FB4 A
 570 = EADB 6
 580 = BBA4 5
 590 = 9719 4
 600 = 4741 2
 610 = 9719 A
 620 = 4FE2 D
 630 = DC7E 3
 640 = C426 5
 650 = 905C 3
 660 = 9719 4
 670 = 88D8 F
 680 = 9719 0
 690 = 98E9 E
 700 = A5A6 0
 710 = CD2F 9
 720 = AAB9 1
 730 = 7CBB 2
 740 = A6AE 6
 750 = 9CF1 6
 760 = 3311 2
 770 =  61E 9
 780 = EC43 A
 790 = 76D9 2
 800 = C7B7 9
 810 = 2AC1 7
 820 =  372 3
 830 = 4D0C E
 840 = A894 2
 850 =  5DF A
 860 = E1AC 0
 870 = 417B 8
 880 = E8A9 A
 890 = E8A9 A
 900 = 5E8C A
 910 = CEDD 6
 920 = DB00 F
 930 = F000 9
 940 = 7602 1
 950 = 6623 3
 960 = 49D0 E
 970 = B7C7 0
 980 = 9CF1 2
 990 = EA45 2
1000 = 1353 B
1010 =  61E 7
1020 = EC43 3
1030 = 2BFE F
1040 = A409 1
1050 = 47A3 E
1060 = 6623 8
1070 = 6992 8
1080 = 5E2F 6
1090 = 6623 D
1100 = E021 9
1110 = 7602 7
1120 = 6992 2
1130 = FC93 A
1140 = E021 7
1150 = 9CF1 A
1160 = EA45 4
1170 = 63B4 F
1180 =  61E E
1190 = EC43 F
1200 = 68AF 3
1210 = A2DD D
1220 = 6B08 D
1230 = 6623 2
1240 = 1975 A
1250 = 6410 F
1260 = E021 1
1270 = 7602 D
1280 = 6623 4
1290 = 1975 8
1300 = E188 8
1310 = E021 7
1320 = 9843 A
1330 =    0 A
1340 = DE2F 9
1350 = E1FF A
1360 = B1A4 8
1370 = AFD4 9
1380 = C32E 9
1390 = 8BAA B
1400 = BB05 E
1410 = 9719 A
1420 = 4D77 7
```

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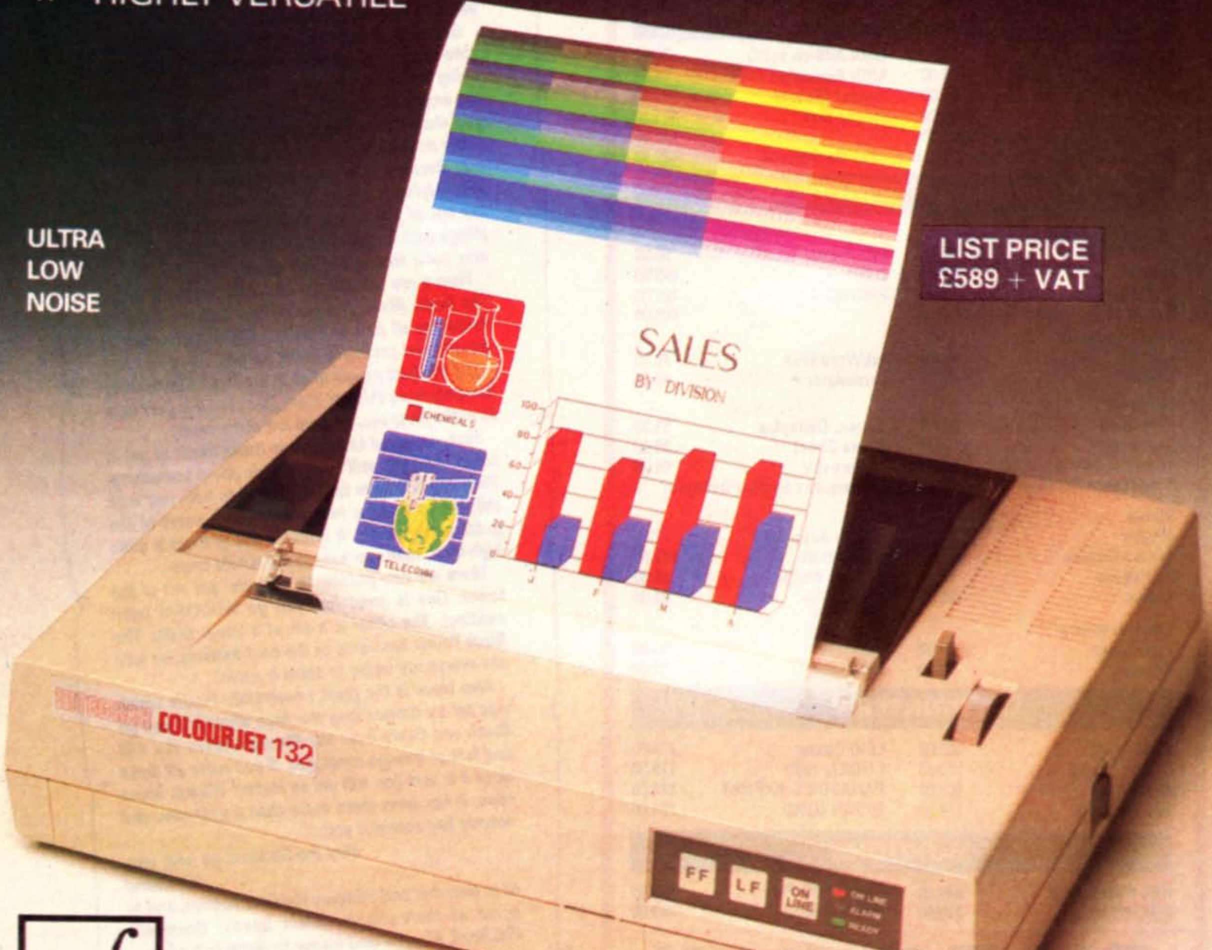

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# The land of Shades

### by someone who has been there and survived

*HELLO again – thinking caps on because I am going to talk about puzzles. There are lots of them in Shades, and it is important to solve them if you want to get on in life and grow big and tough.*

*The most important and obvious puzzles are the ones in the West Tower, which are written on the doors to the rooms. When you have the answer you just type it in and the door will open.*

*Inside those rooms you will often find keys. Don't throw them away because they are important. Take them to the city and find out which doors they open – there is nearly always something important or valuable behind a locked door.*

*Generally if you find something which has very little value it will probably have a use in addition to being rubbish to trip over. The rope, the ebony rod, the empty glass and the rusty coin are all useful and you should experiment to find out what they do.*

*But do not experiment on other people, especially me! Because if it goes wrong you will look very stupid lying in a pool of blood with the sabre sticking out of you. If you find a new object try doing things with it before you cash it in for points – you may get a message which gives you a clue.*

*Then there are puzzles attached to special areas. The Death Maze, the Leech Pool and the Hermit's House are all part of a series. The Mansion has its secrets, and getting in is the hardest.*

*But the best puzzle of all is the Black Tower. Very few people do this any more, because it is very hard to make progress. So here are some clues:*

*First, you need to be able to make music to get in safely. Also you will have to slide down something. Then you will have to get a friend to help you with the rest as it takes two people to do some of the puzzles down there. It is best if one of them is quite high-level, then you can do the whole tower.*

*There are two puzzles to help you get out of the tower. One is great fun, you go WHOOSH! (very exciting). The other is a bit of a yawn really. The Black Tower has some of the best treasure, so let's see everybody trying to solve it again!*

*Also there is the great Immortality Puzzle which was set by Ambushbug the Arch Wizard. If you go South and Down from the Natural Cavern you will find lots of strange messages. If you solve all these clues it is said you will get an instant Wizard. Some hope, it has been there more than a year now and nobody has solved it yet!*

*May the Goddess go with you,*
*Whirlwind*

*Hi to Gauntlet and Stingray the Quizmasters, and to some of their regular brain boxes: Branwell, Pinkfloyd, Kissyfur and Elanor to name but a few.*

You can enter the land of Shades using your micro, a modem – and a registration to MicroLink.
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# Software goes on show

*John Allen passes judgement on a TV programme he helped to produce*

**BBC TV is often criticised for not having enough programmes about micros, a criticism which, on the whole, is unfair. There are a wide range, but as they're produced by the education departments they tend to be aimed at specialised audiences and broadcast at less accessible times. Micro Live was one programme aimed at a more general audience and the recent Software Show is another. This was the brainchild of producer Bryn Brooks aimed at ordinary users with a micro at home, not at experts or addicts.**

At all times we wanted to show not necessarily the best but what represented good value and was sensible for a non-professional environment. Put together by Bryn, director Anne O'Dwyer and myself, for maximum impact the programme was scheduled for two hours and thirty five minutes on one day on BBC 1.

We wanted to reflect a wide range of uses from purely recreational to simple business tools and it soon became apparent that more would have to be left out than included. But there were some areas that we felt it was important to cover:

- To explain the differences between the different micros that can be found in homes and describe the applications to which they are best suited.
- To take a philosophical look at word processing packages – almost everyone uses one and they don't always do what is wanted.
- To find out more about desktop publishing.

The BBC Micro fared remarkably well: There are few things that it will not do, although the small memory does mean that DTP is not its forte. Interestingly, the Archimedes is well suited to DTP, but at the time of recording there was nothing on the market which exploited its full potential. Where the BBC Micro did score was in the variety of software for the whole family.

Virtually every other machine had a better word processor, a better spreadsheet or better art packages – usually because of increased memory. But when you looked outside these standard uses and games it came very much to the fore.

Bird Spy is a case in point: Written for primary schools to accompany a Schools Radio series it now languishes in the BBC Soft catalogue virtually unknown. However, when we asked Going Live viewers to use it in our national bird watch survey on the weekend of 28 and 29 January we had well over 1,000 letters from children wanting to take part.

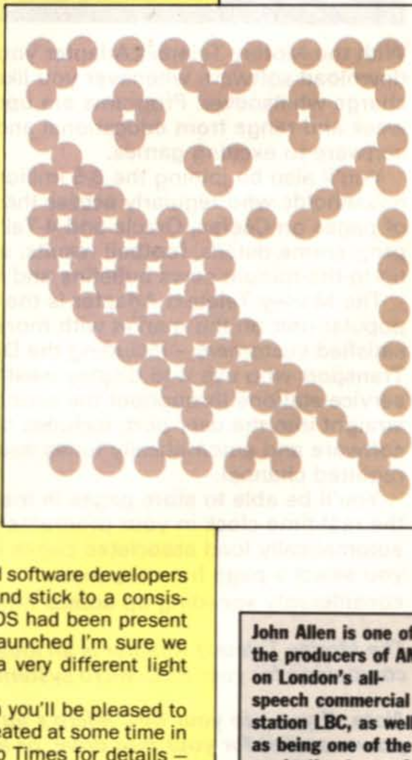
After the watch many parents wrote to say that the program was still in use, recording the birds visiting their table. However, don't let this example fool you into thinking that all educational software is suitable for use in the home – some requires a formal school environment or teamwork from users.

What Bird Spy does highlight is the difficulty of knowing just what's available. Every month *The Micro User* contains reviews of the latest products and advertisements for lots more – for the BBC Micro it is probably the best guide around. But the reviews are largely of new products, and the ads can be bewildering.

In the Software Show we presented examples of good software and tried to give pointers in the right direction, but unfortunately as far as the BBC Micro is concerned the problem seems to be getting worse not better.

Another area that concerned us was just how difficult some programs are to use. Many potentially good items were discarded as we battled through incomprehensible, and sometimes misleading, manuals. Manufacturers and software developers have a lot to learn from the consistent user interface provided as standard on other machines – even the humble Z88, where virtually all software follows the conventions of the operating system, making it possible for owners to learn to use it without spending days carefully reading the manual.

The battle for this sort of intuitive software is lost with the BBC Micro. In the days when it was designed people bought micros to program, so it was designed as a programmer's machine. The Archimedes – a fine machine – provides the right sort of environment and software developers should make full use of it and stick to a consistent user interface. If Risc OS had been present when the Archimedes was launched I'm sure we would see the machine in a very different light today.



If you missed the program you'll be pleased to know that it is due to be repeated at some time in the future – watch the Radio Times for details – and we very much hope to put together another edition in the future, looking at some of the areas we missed this time – communications, the home office and strategy games to name just a few.

If you have any comments then we'd like to hear from you either by post to us at Television Centre or by MicroLink 72:MAG106.

**John Allen is one of the producers of AM on London's all-speech commercial station LBC, as well as being one of the production team of The Software Show. He was Radio London's expert on home computers until its closure and writes regularly for *The Micro User***

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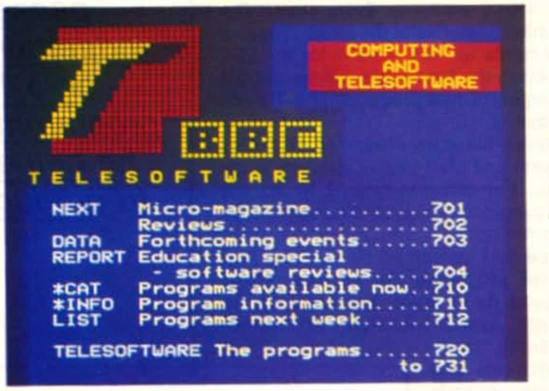

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# Down to the nitty-gritty

*Ken Down continues his series by showing how we can begin to put flesh on our Wimp skeleton*

**WE ended up last month with a dialogue box on screen, complete with beautifully coloured icons, but nothing happened when we clicked on the icons apart from an error message – very frustrating.**

Well, so as not to keep you in suspense any longer, here's the missing function:

```
12500 DEFFNclickdialogwarn(icon%):PROCinvertic
on(dialog%,icon%)
12510 g%=INKEY100:=TRUE
```

Notice that the function name contains the word *warn* which is the same as that given to the dialogue box when we defined it in the data statements. I think you can see how this method can be used for as many different dialogue boxes as you wish, simply by adding more functions called *FNclickdialog[name]*.

This particular function doesn't do anything very significant whichever button you click – apart from invert it then, after a short delay, the dialogue box disappears. Here's the procedure needed to invert the icon:

```
2400 DEFPROCinverticon(window%,icon%)
2410 !block%=window%:block%!4=icon%:block%!8=
&200000:block%!12=&200000
2420 SYS"Wimp_SetIconState",0,block%:ENDPROC
```

Once an icon has been defined you can only change its flag word. This means that things like the text within it – except for writeable icons – and its position on the screen are unalterable without deleting and then recreating it with new data.

The Wimp–SetIconState call uses a parameter block of 16 bytes. The first four hold the handle of the window in which the icon appears and the second four contain the number of the icon, which is simply the order in which the icons were created – the first icon is zero, the next is one and so on.

If you look at the data statements from line 20000 onwards you can see that the first icon is the Stop sprite, the second is the Proceed button and the third is Cancel. You can see that it would be extremely easy to have FNclickdialogwarn adopt one course of action if the mouse clicked icon one and another if icon two were selected.

Now let's look at the complicated part of Wimp–SetIconState: This is how the Programmer's Reference Manual defines it:

```
<new state>=(<old state> BIC block%!12)
 EOR block%!8
```

EOR we are all familiar with, but what on earth is BIC? It's an Arm code instruction to perform a bitwise AND-NOT. For example:

```
    01011101
BIC 00101011
    --------
    01010100
```

What BIC does is force to zero the bits in the first value that correspond to those set in the second. This means that you can explicitly clear, set, invert or leave unchanged a particular bit with the same set of commands:

```
(x BIC 1) EOR 0 = 0
(x BIC 1) EOR 1 = 1
(x BIC 0) EOR 0 = x
(x BIC 0) EOR 1 = NOT x
```

And you can do this for any of the 32 bits in a word independently. It also allows you to use the same

> *“You can explicitly clear, set, invert or leave unchanged a particular bit”*

*Turn to Page 63* ▶

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◀ From Page 61

routine to read and write. All you need to do is change the numbers passed to the routines in the processor's registers.

So to invert the icon colours – which the Wimp will do automatically if you set the select flag – load both *block%!8* and *block%!20* with &20000. This clears bit 21, regardless of what it was before, and then sets it, leaving the rest unchanged.

Of course it might be that you want to change the colour of an icon, not simply invert it. The following procedure does just that. The variable *col%* is the colour that you want in the icon:

```
2500 DEFPROCseticon(window%,icon%,col%)
2510 !block%=window%:block%!4=icon%:block%!8=c
ol%<<28:block%!12=&F0000000
2520 SYS"Wimp_SetIconState",0,block%:ENDPROC
```

Now this is all very well, but you must be thinking that we have forgotten all about accounts – which was the whole idea in the first place. Here then are the first few lines to turn our efforts into an accounts program. First of all we need to add to or re-type the two initialisation procedures:

```
5000 DEFPROCinit:mx%=200
5020 DIMwindow%(32,2),r$(mx%),ac$(150),a$(10),
R%52,list%200
5030 r$()=STRING$(40," "):*POINTER 1
5060 @%=&1020209:L%=0:N%=0:area%=0:account%=0:
alert%=0:bal%=0:del%=0:dialog%=0:edit%=0:ed%=-
1:mbx%=0:mby%=0:mtx%=1279:mty%=1023:w%=0
5070 RESTORE21000:FORi%=0TO6:READa$(i%):NEXT:S
YS"Wimp_Initialise"
5080 PROCmenuinit:ENDPROC
```

With all the areas of memory we are setting aside with the DIM statement it's fortunate that the Archimedes isn't short of ram. Notice the interesting command in line 5030:

```
r$()=STRING$(40," ")
```

It sets all the elements of the array *r$()* to the specified value. In Basic II we would have used a FOR ... NEXT loop but this method is not only shorter but very much faster. Line 5070 reads in data from another data statement.

```
21000 DATABanks,Diggings,Radio,Tour,Printing,Ti
the,Cards
```

The accounts program divides the different accounts up into areas – Banks for example – within which are separate accounts: Banks might contain accounts for Lloyds, Midland and NatWest, or if you only use one what about Current, Deposit and High Yield? In the same way *Credit Cards* might contain accounts labelled Access, Visa and Burton.

Meaningful areas for me are set out in line 21000, but you can substitute your own – Banks, Income, Energy Costs and Housekeeping are possibilities. You may have as many as you would ever need, but if you have more than 11 you will have to increase the number of elements for *a$()* in line 5010.

The next step is to change the menu initialisation procedure to put up a menu that is meaningful for an accounts program. As soon as you have typed it in you can run the program and admire your handiwork. Notice that all options are disabled apart from New account and Load from disc.

If you want to check that all the sub-menus are working correctly you will have to delete all the disable signs – | – in line 5230. Just make sure that you replace them afterwards. Here's the menu initialisation code:

```
5200 DEFPROCmenuinit
5210 area$="7Choose@area:|.Banks|.Diggings|.Ra
dio|.Tour|.Printing|.Tithe|.Cards|"
5220 del$="3Delete:|[area$].Area|[area$].Accou
nt|.Entry|":os$="1Command:|^mtext%,20|"
5230 load$="1Load@file:|^filename%,11|":save$=
"1Save file:|^filename%,11|"
5240 menu$="9Main@Menu|[area$].New account|$Ne
w@Entry|$Edit@Entry|[del$]$Delete|[area$]$Disp
lay@Acc|$:Balance|[load$].Load...|[save$]$Save
...|[os$].*@Command|"
5250 j%=FNcreatemenu(menublock%,menu$,textbloc
k%):ENDPROC
```

If you have used more than seven of your own

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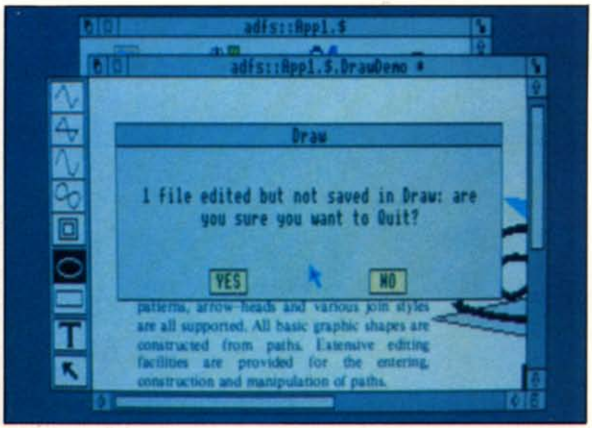
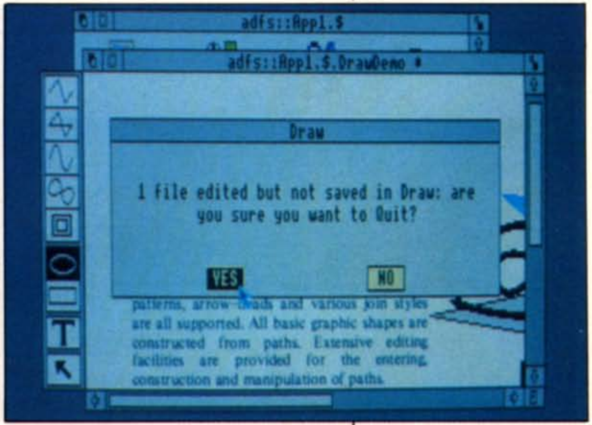


1 File edited but not saved in Draw: are you sure you want to Quit?

patterns, arrow-heads and various join styles are all supported. All basic graphic shapes are constructed from paths. Extensive editing facilities are provided for the entering, construction and manipulation of paths.

*Initiating a dialogue*



1 File edited but not saved in Draw: are you sure you want to Quit?

patterns, arrow-heads and various join styles are all supported. All basic graphic shapes are constructed from paths. Extensive editing facilities are provided for the entering, construction and manipulation of paths.

*Select your icon*

◀ From Page 63

area names you may well find the program hanging up mysteriously. What usually happens is that you click the menu button and nothing at all happens. Try typing this:

```
MODE12:REPORT
```

Most error messages such as *No such variable at line xxx* you can deal with yourself, but there is one quite baffling one: *Address exception at* followed by some quite incredible hexadecimal number.

The cure is to increase the memory blocks *menublock%* and *textblock%* in line 50020. It's quite simple really. FNcreatemenu creates the menu in *menublock%* but because it's too short the new menu overwrites some variable locations. Either Basic or the Wimp then innocently tries to access an address for which there is no ram, and the error occurs.

So now let's try doing something meaningful with the menu. Type in this line, which replaces the call to PROCzero in our skeleton program:

```
1620 WHEN0:$filename%="":PROCnewaccount(poll%!4)
```

Notice that we first set *filename%* to a null string – we could also use a default value that would appear and be accepted without further input. PROCnewaccount is very simple:

```
10000 DEFPROCnewaccount(p%):IFp%=-1PROCcreatea
lert("Invalid Selection"):ENDPROC
10010 ac%=p%:RESTORE20000:dialog%=FNcreatedialo
g(7)
10020 PROCsetcaret(dialog%,1,0,0,-1,0):ENDPROC
```

All this procedure does is to set up a dialogue box by calling FNcreatedialog and set the caret to appear in one of the icons. If PROCsetcaret were omitted the caret would not appear until you clicked the Select button in the relevant icon.

Unlike most other Wimp calls, *Wimp–SetCaretPosition* does not use a parameter block. Instead all the necessary parameters are passed in the registers.

R0 holds the window handle, but if you set this to -1 it has the effect of turning the caret off wherever it is. R1 holds the icon number but if the caret is to appear in a window instead this should be set to -1. R2 and R3 hold the position of the caret relative to the window or icon origin as the x and y axis offsets respectively.

R4 gives the height of the caret. If this is -1 the Wimp works it out for you but if you must set it yourself the first 24 bits – 0 to 23 – of the number hold the height in operating system coordinates, which are not at all the same as the normal graphics coordinates.

If bit 24 is set you get a VDU5 type caret, otherwise it's the anti-aliased one. On the other hand, if bit 25 is set the caret is invisible and it is up to you to draw it – this is needed so that the Wimp knows where it is currently supposed to be and ensures that text goes into the right icon or window.

Finally R5 contains an index into the string, giving the position of the caret relative to its characters. Setting this to –1 leaves it up to the Wimp to work out again.

```
2900 DEFPROCsetcaret(r0%,r1%,r2%,r3%,r4%,r5%):
SYS"Wimp_SetCaretPosition",r0%,r1%,r2%,r3%,r4%
,r5%:ENDPROC
```

Of course we need to have different data for the dialogue box from that of the simple Proceed/Cancel one we drew up before. As we don't need that any more, let's replace the data for it with the new values:

```
20000 DATAaccount,5,532,900
20010 DATA290,800,498,860,1,7,&303D,a$(ac%)
20020 DATA290,600,498,680,7,0,&F115,"filename
%,12"
20030 DATA290,400,498,480,7,0,&303D,Cancel
20040 DATA290,200,498,280,3,0,&303D,OK
20050 DATA40,24,250,880,7,0,&303D,"FNnewacc(a
c%,&91)"
```

Notice that the icon defined in line 20020 is writeable – you might find it interesting to run all the flags through PROCdecodeicon just to see what they mean.

Line 20050 causes the dialogue creator to call FNnewacc which lists all the accounts in a par-

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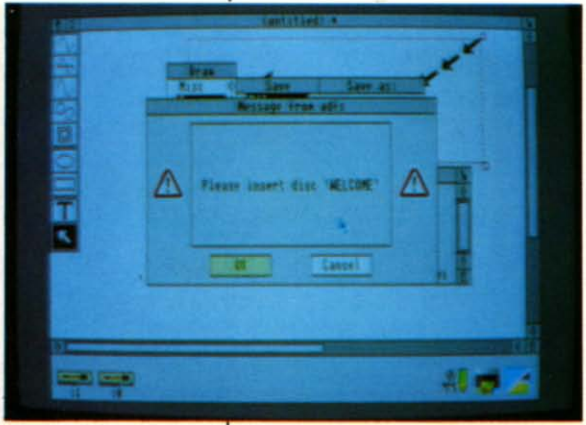
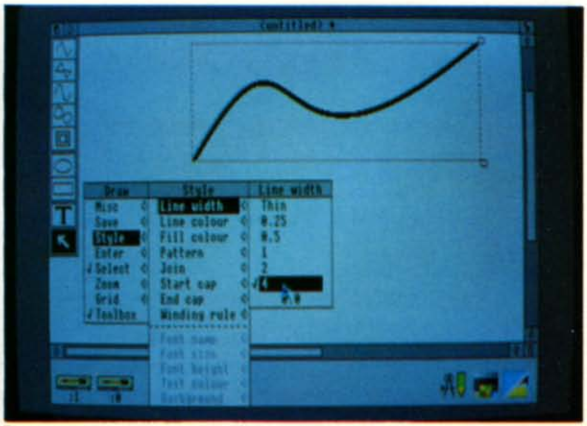

Please insert disc 'WELCOME'

Warning dialogue box



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◀ *From Page 64*

ticular area in their own separate icons within. We'll look at that with the data structure next month. The only thing to notice is that you are allowed a total of 20 accounts per area – mainly because that is the maximum number of icons you can fit in the dialogue window.

Finally we deal with clicks within the dialogue box:

```
10100 DEFFNnewacc(ac%,type%):LOCALi%:a$="":i%
=0:t%=ty%-4:z%=0
10110 WHILEi%<=N%:IFASC(LEFT$(ac$(i%),1))=ac%
THEN
10120 PROCcreateicon(h%,bx%+4,t%-40,tx%-4,t%,
7,0,type%,0,MID$(ac$(i%),2))
10130 t%-=40:z%+=1
10140 ENDIF
10150 i%+=1
10160 ENDWHILE
10170 FORj%=z%TO20:PROCcreateicon(h%,bx%+4,t%
-40,tx%-4,t%,7,0,type%,0,""):t%-=40:NEXT
10180 =z%
```

The first line deals with Cancel by setting the icon colour to red, closing the dialogue window and re-setting the mouse limits to the whole screen. By setting the string *claim$* to null we prevent the program calling this routine again until we ask for it.

The next line covers the possibility of clicking "OK" without entering a filename. We have not yet entered PROCcreatealert, so if you do this expect to receive an error message and to bring the program to a crashing halt.

The remaining lines of the program store the account name you have given, and affect the menu. After the first name the Load from Disc option is disabled and after the second is entered the New Entry option is enabled. So here it is:

```
10200 DEFFNclickdialogaccount(icon%):IFicon%=2
PROCseticon(dialog%,icon%,2):PROCclosewindow(d
ialog%):PROCmouselimit(0,0,1279,1023):claim$="
":=FALSE
10210 IF$filename%=""PROCcreatealert("You have
 not given an account name!"):=FALSE
10220 PROCinverticon(dialog%,icon%)
10230 IFicon%=3ac$(N%)=CHR$ac%+$filename%:N%+=
1:IFN%=2i%=INSTR(menu$,"*New Entry"):MID$(menu
$,i%,1)=".":i%=INSTR(menu$,"*Save"):MID$(menu$
,i%,1)=".":j%=FNcreatemenu(menublock%,menu$,te
xtblock%)
10240 IFicon%=3IFN%=1i%=INSTR(menu$,".Load"):M
ID$(menu$,i%,1)="*":j%=FNcreatemenu(menublock%
,menu$,textblock%)
10250 IFicon%=3=TRUE ELSE=FALSE
```

● *Next month we'll continue to develop the accounting part of the package.*

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**TO begin with, I'm not one of those people who ingests the more arcane aspects of relational databases along with the breakfast cereal while completing the morning crossword in five minutes. Rather, I am one of those who needs gently taking by the hand by those who would see me suitably instructed.**

At the same time, needing to be as efficient as possible in my administration I, like countless others, have seen the need for micros in my work. For that reason I have been using the BBC Micro for some time and recently bought an Archimedes as the most suitable and flexible upgrade on the market.

However, thoroughbred hardware is of little use unless there is software of a similar quality available which exploits it to the best advantage. Thus I was more than interested when I came across Flying Start II, since a good database is more than helpful in my day to day administration. I have two main requirements: It must be flexible and easy to use. I need a very sophisticated product – it must not blind me with esoteric jargon and functions, but it must successfully perform the job that databases of this sort aim at.

The package consists of two discs, two instruction books and some additional material specific to the Archimedes version – which must have at least a megabyte of memory. The Archimedes booklet begins by explaining very simply and clearly how to install the program – Shift+Break – and then advises you to make a working copy. Often this is where you might get irritated, since it means leaving the program, formatting a disc and then making a copy.

Flying Start II has a disc formatter as one of the utilities in its Protect Systems menu as well as a Copy floppy disc option, so making the backup could not be easier. Careful attention is also paid to instructing you how to enter the program from both desktop and the supervisor prompt. Hard disc users are similarly well catered for.

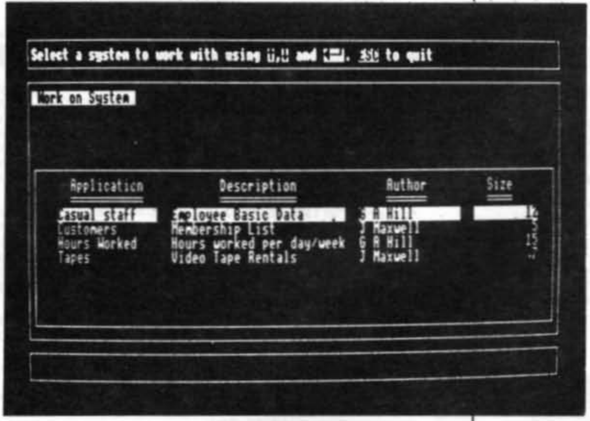
The two booklets supplied are the tutorial and the manual. As with all packages of this type, an hour spent quietly getting to know their contents is not wasted. The tutorial is particularly valuable as it takes you step by careful step through the whole business of creating a system. In this particular case the example given is that of a firm of solicitors which needs to create a system of case files so that they are readily identifiable by client's name, case file number or the name of the partner who deals with the client.

The important point is made that preliminary work is best done on paper as the layout and organisation of information is decided upon. Helpful suggestions are made as to the best way to set up the fields needed so as to optimise memory available.

Next you are taken keystroke by keystroke through setting up a system. In my case I created a dummy file on my church youth group, enabling me to record such things as birthdays and what other areas of church life they participated in so that cross-referencing can be done easily and groups of individuals selected according to their various interests. Four types of field can be chosen – characters, a date, a logical field giving a yes/no option – in my case, whether they were confirmed or not – and finally a numeric one, since Flying Start II can perform calculations when required.

It really could not have been easier. I was

**Turn to Page 68 ▶**



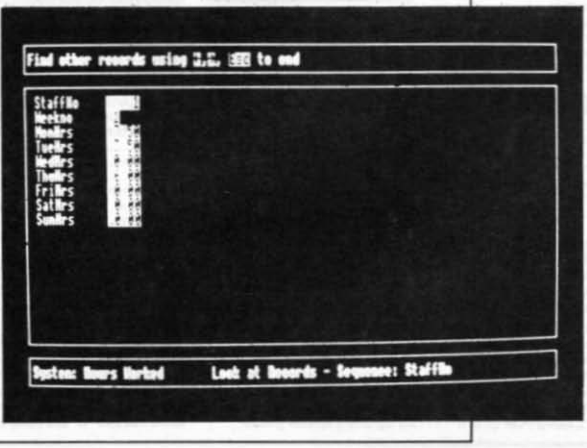
```
Select a system to work with using [illegible] and [illegible]. [illegible] to quit

Work on System

   Application       Description                Author      Size

   Casual staff      Employee Basic Data        G A Hill
   Customers         Membership List            J Maxwell
   Hours Worked      Hours worked per day/week  G A Hill
   Tapes             Video Tape Rentals         J Maxwell
```

*Selecting a data file*



```
Find other records using [illegible]. [illegible] to end

StaffNo
WeekNo
MonHrs
TueHrs
WedHrs
ThuHrs
FriHrs
SatHrs
SunHrs

System: Hours Worked      Look at Records - Sequence: StaffNo
```

*Searching the file*

◀ *From Page 67*

guided through the correction of typing errors, shown how to enter a password – essential for confidentiality – helped to create fields of the right size and type and offered a choice of fields from which records could be selected. In other words I was given the ideal card index system, but on a micro rather than in several boxes.

Next I tried manipulating the records in various ways, adding to them, altering them, listing them and looking at groups according to various criteria chosen.

Apart from the options for locating and adding records there are Reports, Labels and Data list. This last provides a quick means of listing all the data in a particular record system. Reports and Labels enable you to print information in a wide variety of ways, and Labels does the obvious – names and addresses are prepared for a mailshot.

Once the report has been designed to your satisfaction so that all relevant information is provided, that particular definition is automatically saved on disc so that it can be used subsequently without any fuss.

And this is only what the tutorial can achieve. The manual – a model of clarity – sets out the various procedures and options available in a more detailed way. Again no effort is spared in order to make things easy to understand.

The second disc is likely to prove invaluable to many small businesses. Called the Pilot Systems disc, it contains a series of templates enabling eight different systems to be set up without effort. These range from a basic personnel record card to a building maintenance log. There is a library catalogue, two types of address book – business and personal – and so on and each has ready-made reports and labels where needed together with information on how they may be used to the best advantage.

The backup support offered by Mitre Software is clearly of the highest quality and the documentation provided in the package is a model of lucidity and helpfulness. Flying Start II is exactly the right tool for many thousands of small businesses: It will take a morning's work to get the feel of it and a couple of days at most in order to put it to good use. It will easily repay its cost within a few months. I cannot recommend it too highly.

## Summing up

*Flying Start II is very difficult to criticise – in fact I found nothing about it that I didn't like. It's very easy to use, has superb documentation and the examples given are for real applications and so show the sort of thing that you need to create for your own work.*

*The price may seem high to some but considering the value for money it's an absolute bargain.*

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# UPDATE

## Learning aids for the young

USING PICTURES is one of the latest products from Widgit Software (07072 64780) developed in collaboration with Great Ormond Street Hospital. It taps a large colourful picture library to support language development in young children. The package, price £40.25, has been developed for use by speech therapists as well as teachers.

Also available are a series of programs for the very young featuring a friendly character called Blob. For a first introduction to micros and switches there is Blob 1. Blob 2 teaches directional manipulation and selection which are of importance to the handicapped child and Where's Blob builds on these skills. BBC Micro 8 bit versions of Blob 1 and 2 cost £13.08 and Where's Blob costs £17.25.

Completing the line-up from Widgit is Going Places, a set of 16 discs with 13 games operating on three levels. That costs £40.25.

## Charity helps literacy drive

AN anonymous London-based charity has provided £50,000 to fund 1000 free copies of Special Needs Software's Wordwise Plus Literacy Pack for adults with literacy problems.

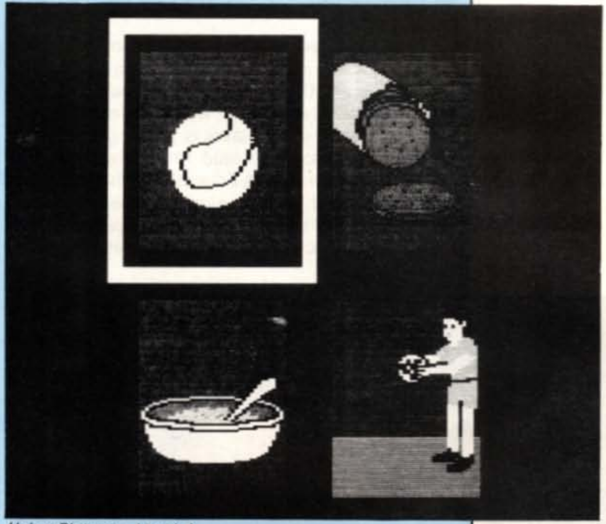
Ron Lander, chairman of Special Needs, said: "There is strong evidence to suggest that some 13 per cent of the adult population is suffering from difficulties with basic literacy and/or numeracy. As a consequence, too many are seriously disadvantaged and lack self confidence. Our new pack has been designed to help such people.

"Now, anyone who has access to a BBC Micro has an opportunity to obtain a pack free of charge thanks to the generosity of an anonymous donor".

Anyone engaged in adult literacy work who would like a free pack should write explaining their work and why their resources are insufficient to buy one. Letters should be sent to Alan Clarke, Learning Technology Unit, Room W533, Training Agency, Moorfoot, Sheffield S1 4PQ.

## Acorn successful in the schools

"WE are in the education business for the whole journey. Our commitment is total and ongoing". That was the emphatic message from managing director of Acorn Computers, Harvey Coleman in an exclusive interview with *The Micro User*. He reported that following the ever popular BBC B, both the Master and Archimedes are selling well to schools.



*Using Pictures, Level 4*

Acorn also has high hopes for its new Unix R140 Risc-based workstation in the realms of further education. "We are getting to the point of having a three-pronged attack into the education market", said Mr Coleman. "The number of Archimedes now going into education is in the tens of thousands. We have sold over a quarter of a million Masters and nearly half of these have gone into schools. Last year alone we sold over 40,000 Masters and in the last quarter we had an almost unprecedented demand".

The Department of Trade and Industry has announced a £4 million schools initiative to support design and technology as a core subject in the national curriculum. It lays particular emphasis on new technology. Mr Coleman recognises the importance of information technology in the new curriculum and said Acorn will be giving its full support.

## Get switched on..

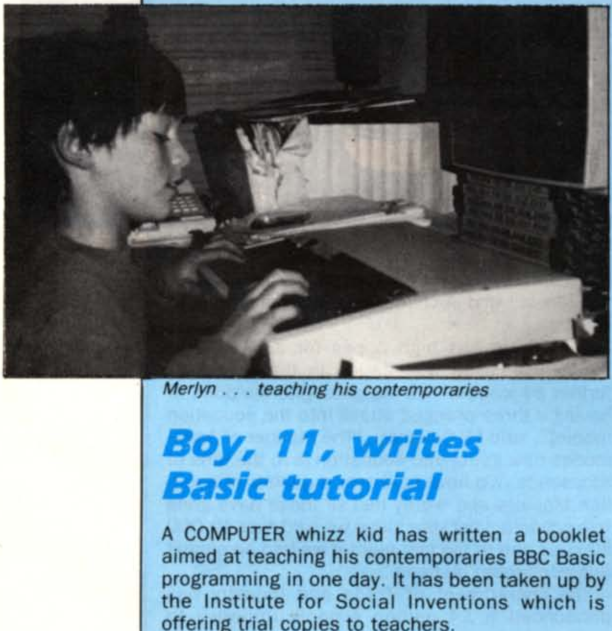
THREE programs have been developed to help primary pupils to understand electricity. Simple Circuits, Fuses and The Safety Game have been produced for Understanding Electricity, the educational service of the electricity supply industries.

They run on the BBC B and cost £3 each or £8 for all three from Understanding Electricity, The Electricity Council, 20 Millbank, London, SW1P 4RD.

## Music project runs on BBC Micros

EIGHT bit BBC Micros have been chosen for a music project at the University of Warwick in preference to the 32 bit Archimedes. The curriculum development project, called Touching Sound, has involved primary and secondary pupils and those with special needs. It has spanned an age range from two to 19.

It has resulted in the development of music software for use with the Music 5000 synthesiser, 4000 keyboard and either BBC B or Master. "The development work is complete, and excitement and enthusiasm is growing from both teachers and pupils", said Phil Ellis, Principal Research Fellow in Arts Education."This software was researched and developed extremely rigorously to ensure that it did in fact support a contemporary music curriculum and in this respect it is unique".



*Merlyn . . . teaching his contemporaries*

## Boy, 11, writes Basic tutorial

A COMPUTER whizz kid has written a booklet aimed at teaching his contemporaries BBC Basic programming in one day. It has been taken up by the Institute for Social Inventions which is offering trial copies to teachers.

London schoolboy Merlyn Albery-Speyer, who wrote the tutorial when he was 11, had been programming on his BBC micro for nearly a year. "As soon as I started programming, I found it just as much fun as playing computer games", he said. "I wrote the booklet because I found most instruction books far too long and complicated for beginners. Using it, you should be able to learn simple BBC Basic programming in less than a day of hard work. My friends have taken between four and five hours".

The Institute for Social Inventions is a charity which runs creativity and community enterprise workshops in schools.

Its chairman, Nicholas Albery, told *The Micro User*: "The booklet is much less complicated than the normal introductory books, is written from a child's perspective and shows how to do 16 simple BBC Basic programs. It will be useful for teachers with BBC Micros who want to introduce primary or older children to the feel of computer programming".

Trial copies of the booklet are available from the ISI, 24 Abercorn Place, London NW8 9XP for the price of four first class stamps. Normal price is £2.50.

## Archimedes in primary schools

A PIONEERING scheme to develop the arts in primary schools will be combined with the opportunities offered by the Risc-based Archimedes. The Canto (Creative Arts and New Technological Opportunities) project is sponsored by Acorn Computers in collaboration with Lincolnshire Local Education Authority.

Taking part will be 11 primary schools in the West Lindsey district and the secondary school they feed. Each primary school will focus on one area of the arts curriculum including music, art and design, drama, dance and movement and textile design using Archimedes supplied by Acorn.

Hardware add-ons such as Concept keyboards, video and audio digitisers and software including ProArtisan, Acorn Desktop Publisher, Autosketch and Studio 24 Plus music packages will also be used. Results and findings from the initiative will be made available to schools throughout the country. They will also go to hardware and software manufacturers to give pointers on future product development.

Director of the CANTO project is Ian Hirst, head of Cranwell Primary. "I am confident that it will demonstrate how the Archimedes computer can enhance primary teaching and point the way to its use throughout the national curriculum", he said.

Managing director of Acorn Harvey Coleman told *The Micro User*: "Risc OS provides such user interest that youngsters take it up very very easily. We see it as an important part of the primary environment and I think that is a market we will be moving into more".

## Scetlander picks distributor

SCETLANDER (041-357 1659), the educational software subsidiary of Scotlander plc, has appointed AVP Computing as a distributor for its products both in the UK and overseas.

Managing director of Scetlander Ron Lander said: "So much of our energy has been devoted to program development and improvement it has become clear that the use of quality distributors like AVP can help the company reach end users even more effectively". Scetlander is a leading source of BBC Micro educational software and one of its most popular products is the Wordwise Plus Literacy Pack.

For AVP (0291 625439), general manager Laurence Nauen said: "We are delighted to add the list of Scetlander programs to our comprehensive range of educational software products".

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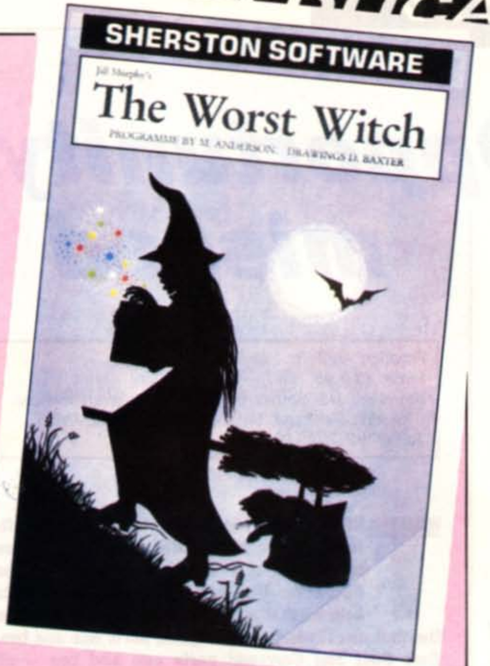
# Completely wicked

Can the game of the book be successful? Peter White investigates

*Product: The Worst Witch*
*Price: £21.85*
*Supplier: Sherston Software, Swan Burton, Sherston, Malmesbury, Wiltshire SN16 0LL.*
*Tel: 0666 840433*



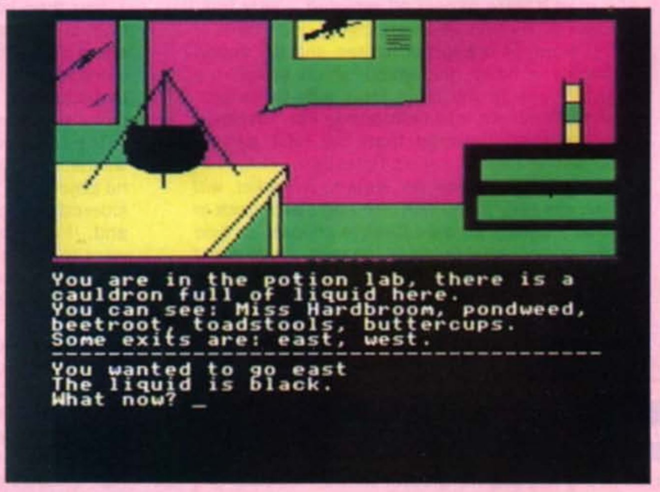
**THE Worst Witch is an adventure program based on the very popular book by Jill Murphy. The players take the part of Mildred Hubble and the task is to save the school from the evil intentions of the bad witches. The program is designed for junior pupils and is of a size appropriate to that age range. There are 32 locations and for each, the top half of the screen shows a picture and the bottom half a written desciption.**

As is usually the case with Sherston Software, the pictures are of a very good quality and the language level is suitable for the intended audience. It is a shame that the pictures do not tell you what direction you are facing, but the poster that comes with the pack can provide help here.

As in all good adventures, positions can be saved and re-loaded, which involves using a separate data disc. The teacher's booklet explains that all saved positions must be given different filenames.

The puzzles presented would not tax a serious adventurer, but offer a suitable challenge to the intended audience of school children. Some of the locations or characters are for fun only – for example, there is a tree to climb and a friendly frog to say hello to. Visits to the Library and Potion Lab will be essential so that would-be witches can learn and then practise the art of magic.

Children using this program will need to visit their own school library first, since a knowledge of the original story is more or less essential. Only then will they know how to get a broomstick to fly and which other characters to trust and which to avoid.



```
You are in the potion lab, there is a
cauldron full of liquid here.
You can see: Miss Hardbroom, pondweed,
beetroot, toadstools, buttercups.
Some exits are: east, west.
----------------------------------------
You wanted to go east
The liquid is black.
What now? _
```

The game recognises an extensive range of words which are listed in the accompanying booklet and on a card which can be given to pupils; they may also be printed out from the teacher instructions on the disc. The manual contains a complete solution to the puzzles and a map of the entire area.

The section on ideas for further work is particularly valuable with suggestions for different curriculum areas including science, moral education and mathematics. There is even a list of other suitable witch books and witch music.

The disc also contains the text of a play – Can't do Frogs – which can be freely printed out. Instructions are given for printing direct from the disc or via a word processor. This short play is written for junior children and has many short speaking parts plus plenty of scope for extras. The booklet suggests that Can't do Frogs is suitable either for a school assembly or for performance in front of parents.

## Summing up

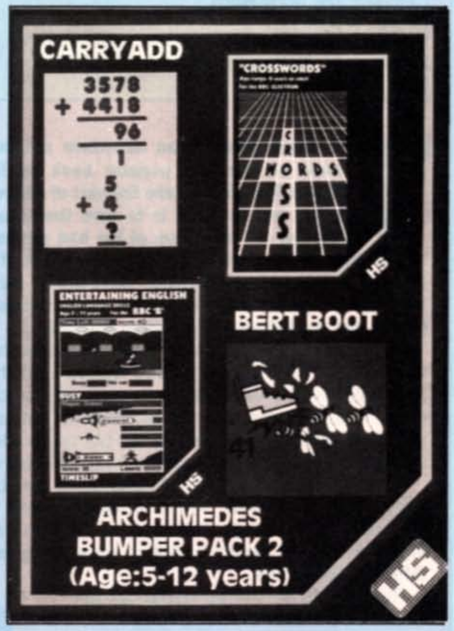
The program is first rate, and the teacher support material that comes with it makes this a truly valuable resource. The booklet also contains suggestions for classroom and time organisation.

Another excellent Sherston product.

# Opportunity missed

*David Marshall takes a look at educational software for the Archimedes*

*Product: ArcSoft*
*Price: £19.95*
*Supplier: HS Software, 56 Hendrefoilan Avenue, Sketty, Swansea, West Glamorgan SA2 7NB.*
*Tel: 0792 204519*



**THERE is still very little primary school software for the Archimedes, and HS Software has put six of its best known titles from the BBC Micro together in this two-disc pack to help fill that gap. There are five programs on the first disc: Entertaining English, parts one and two, Bert Boot and Carryadd parts one and two – all designed for pupils between the ages of five and twelve. On the second there is just one: Crosswords.**

Entertaining English part one has a bee that performs certain actions and you have to type in the words to describe them. There are five skill levels and you also have the choice of typing in either the verb only or verb plus adverb.

The screen instructions claim that higher scores are given for unusual or imaginative answers. However, the pupils who tried it protested that this was not so. Further down the screen instructions it says that if the micro beeps your word is not recognised, so try again.

It seems that the game's vocabulary is very limited as the more imaginative answers of those who tried it were almost all rejected – very frustrating for children who were trying quite hard.

The graphics are rather limited and the sound is frankly a noisy distraction which brings me straight away to the main fault with these programs: They are old-fashioned. For instance here's a short passage from the next part of Entertaining English called Timeslip:

*Five sentences will be shown, a rocket will collect the verb from each one and travel back in time to a cave. You then have to choose, or type in, the correct past tense of the verb. Try to avoid colliding with the pterodactyl as this lowers the number of lasers, and your score for each correct word depends on the number lasers left.*

We stopped using that sort of software in our primary school about three years ago: It is simple drill and practice stuff that can be done as easily – and possibly better – without a micro.

To be fair, there's nothing actually wrong with the software – it doesn't set out to do anything more than it claims, and it is relatively harmless. Having said that there was one part of Bert Boot that both I and the children did find hard to take: At the beginning of the game you choose the type and number of problems you want to tackle.

You then have to decide what you want Bert Boot to squash – the idea is that the Boot travels along squashing creatures to reveal what sort of sums you are involved with. You then have to type in the answer, which the Boot checks by travelling along again and squashing once more.

The three creatures you must choose from are wasps, flies and beetles. Now most children have no objections to squashing flies, wasps are considered public nuisances that should be avoided and, if all else fails, squashed – but who would want to hurt a beetle? This may not seem important, but if the program had any intrinsic merit – which it doesn't – the beetle factor alone would condemn it.

Carryadd parts one and two are very simply drill programs that show the pupil how to do addition and subtraction sums and then test them.

And what about Crosswords on the second disc? It doesn't tap the resources of the Archimedes but it is rather better – especially if you like crosswords, of which there are 20. Some require numbers as answers, others require words, and you can save unsolved ones for later. But we possess just such a program for the BBC B – and have had it for years.

This software package may or may not be worth buying for your school, but it is certainly not worthy of the machine it is now designed for. Something better that is written specially for the Archimedes will be along soon.

## Summing up

*These programs do not in any way use the greater speed, flexibility or power of the Archimedes – they are just straight transfers from the 8 bit machine. If you have seen any of the small amount of software that can be used in the primary school for the Archimedes using its enhanced specification – Artisan, the new Droom or Desktop Stories – you will know what can be achieved.*

*HS Software may be trying to fill a gap – but it would be better to wait. Those primary schools that have invested in an Archimedes will be looking for rather better things than this.*

# Maps and devils

## Lee Peters surveys a new package on simple cartography

*Product: Mapventure*
*Price: £24.15*
*Supplier: Sherston Software, Swan Barton, Sherston, Malmesbury, Wiltshire SN16 0LL.*
*Tel: 0666 840433*

**THIS new product from Sherston is described as a geography/mapping adventure for upper junior and lower secondary pupils. It follows the company's tradition of large, colourful and appealing graphics in conjunction with bold and sensible text with the screen displays always making it crystal clear what is expected next. Pupils learn and enjoy themselves at the same time.**

The aim of the program is to introduce you to plan views and then map symbolism. This is achieved via two children, Amy and Simon, who must find where members of the Red Devil Gang have hidden their flag. Part one begins by showing a table with objects scattered on it presented as side and plan views. Items are highlighted in one picture and the pupils must identify the same object in the other.

The action moves to the kitchen. Again two views are shown, but this time selected areas must be found. From the kitchen, we move outside and see a front view of the house which converts itself to a plan from which areas must be located. Then it's up and away in a balloon, so that the view below encompasses a larger area but with less detail. The plan becomes a map and the two children are sent off on various tasks.

The function keys are used to indicate the eight points of the compass for navigating around the map – and a keystrip is provided. You must move the children to a suitable site, using coordinates, so that they can pitch their tent. This task proves very difficult at first as you are on a hill with no marked contours but it becomes easy when they are shown.

Having acquired the required knowledge, you are now ready to accompany Amy and Simon on to part two, the adventure itself. The task is to identify a number of clue sites which will lead to the Red Devils' flag. The clues, randomly picked from a total of 23, are cryptic enough to provide a challenge, but if you have completed part one this should present no real problem.

A copy of the map – several in colour plus a black and white photocopy master are included in the pack – will be essential since the Red Devils have laid ambushes which must be avoided. It is also possible to make the journeys more interesting, perhaps by a visit to the church, castle, lifeboat station or manor.

This package is an ideal introduction to geography and mapping and well up to Sherston's usual high standard.

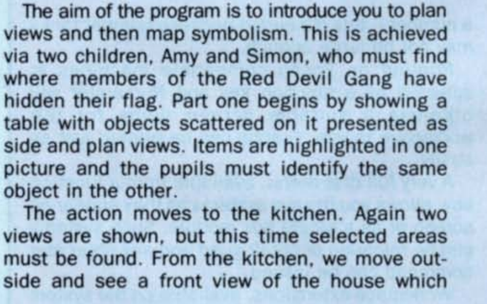
### Summing up

*Pupils are well catered for with Mapventure, as are teachers. The booklet contains Sherston's familiar advice on how to use the program, ideas for work away from the micro in different curriculum areas and a list of organisations to contact for extra help.*

*The software is well written and is ideal for primary schools where group work is the norm. There is no network version, so it can only be used on one machine at a time. Even so it is excellent.*

# The numbers game

## Rog Frost calculates how an unusual aid performs



*Product: Numerator*
*Price: £39.00*
*Supplier: Logotron Education, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ.*
*Tel: 0223 323656*
*Requirements: B+128 or Master series*

**LOGO by Logotron has become the standard of that language for the BBC Micro. With this in mind, teachers will be looking for something special and challenging. Numerator provides an arithmetical investigation tool capable of being used at junior schools or at the more sophisticated levels demanded by upper secondary pupils.**

The Numerator pack consists of a manual of about 200 pages and three discs – only one on the ADFS version – along with a function key strip. The discs are labelled System, Walkthroughs and Modules. The first task is to boot the system disc which loads the Numerator rom image into a side-

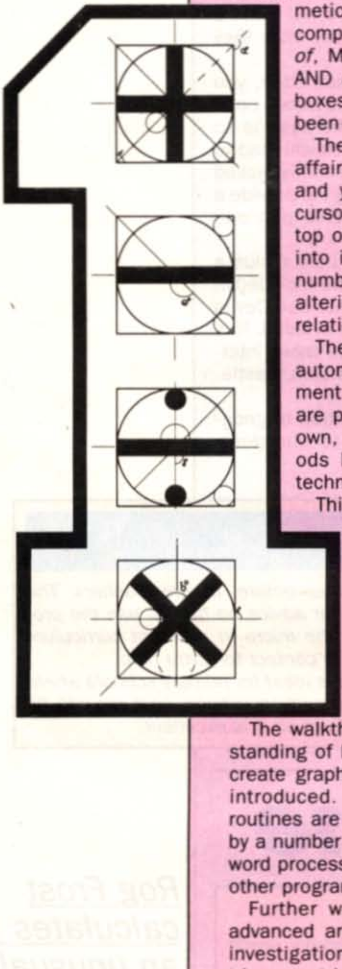
Turn to Page 76 ▶

◄ From Page 75

ways ram slot and presents a menu of options.

Having read the introductory pages, you will probably want to turn to the walkthrough routines to learn something of what Numerator can do – a large chunk of the manual, as well as one disc, is devoted to it.

On loading a walkthrough the screen display shows a number of boxes connected by a series of pipes. Some contain numbers, others arithmetic operators such as + and – or more complex processes such as *to the power of*, MOD and DIV. Logical operators like AND and OR are also available. Further boxes may contain a module which has been created earlier and stored on disc.



The first walkthrough is a very simple affair: A mystery module has been created and you must identify what it does. A cursor can be steered to a box near the top of the screen and a number entered into it. When Copy is pressed a related number appears in the lower tank. By altering the one at the top you can find the relationship.

The next walkthrough introduces the automatic clock and systems which increment themselves. Logotron now feels you are probably ready to start devising your own, so instruction is given on the methods Numerator uses and construction techniques.

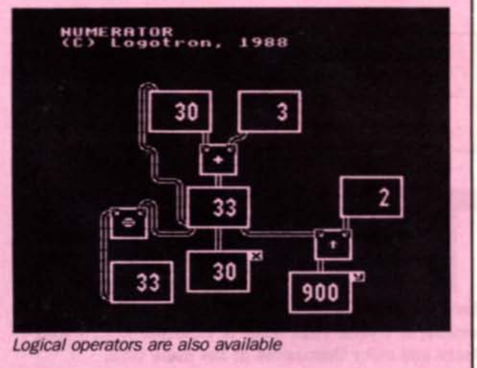
This is a straightforward process with the various different boxes selected by function keys and moved into place by cursor keys. At each press of Copy, or tick of the clock, each tank sends its number down a pipe to a process box. Here the arithmetic operation is carried out and the result is sent to another number tank.

The walkthroughs then lead you to an understanding of labels and how they can be used to create graphs and charts. File handling is also introduced. They can be saved on disc and routines are available to convert data produced by a number experiment to Ascii – for use with a word processor – or to Basic for incorporation in other programs.

Further walkthroughs give detail on more advanced arithmetic and lead on to statistical investigations on dice, coin tosses and even trigonometric functions.

The modules library contains some 40 systems including a clock, a counter and a binary to decimal converter. Some are more complex, such as an ellipse equation, a quadratic equation solver or various pseudo-random events. All of the modules are well described in the manual with diagrams showing how they are built up from the basic blocks.

The manual's reference section is very thorough, giving advice on all areas that teachers might need, including help with Econet versions. Graph and chart drawing is very simple: Pressing Control+G will create an on-screen graph if X and Y labels have been set. Control+C produces a bar chart, while Control+R will reveal the full value of a number – this is needed because number tanks may not be large enough.



NUMERATOR
(C) Logotron, 1988

*Logical operators are also available*

Printing on Epson compatible machines is selected by a function key and Numerator will organise a suitable screen dump for the workspace in use. Graphs can be printed just as easily.

A very full disc menu, available from a function key, allows you to save systems as they appear on screen or as a single box module. Such systems can be reloaded or catalogued and any other star command can be issued.

Workspace extensions, available on the system disc, can really increase the scope of Numerator. You can output sound – different numbers to give different pitches – which makes it possible to create dice for blind people.

A clever extension allows data to be input via the user or analogue ports. Instructions are given for making a simple temperature probe, with advice for implementing investigations. Advice is also given on the use of switches for such tasks as monitoring birds landing on a bird table. Other extensions allow for input via a Concept keyboard or a mouse.

A useful utility for teachers is the ability to create a system by entering a mathematical expression from the keyboard. This means that complex number machines can be created simply and then used as part of a numerator investigation.

Perhaps the most useful parts of the manual are the comments by teachers who have tried out the material and the transcripts of the pupils' talk while using Numerator. This section gives an honest appraisal of how pupils from both junior and secondary schools used the program. It is well worth reading, although teachers will no doubt have comments about the trials being done out of school and with small numbers of pupils.

## Summing up

*Numerator is a program that will immediately appeal to some enthusiastic teachers. Others will need persuading that the time spent learning it will justify the benefits to pupils. Many will wish that the screen displays had more appeal and some will consider that pupils will find it hard to control the cursor. Many secondary teachers will consider that much of what Numerator can do could also be done on the ubiquitous spreadsheet.*

*Despite some reservations, I feel that Numerator has a lot of potential, and advisers and crusading teachers should do their best to get the program into the education system.*

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| | |
|---|---|
| EASY-PC | £270.00 |

P&P Free

**PCB TURBO V2** Unbeatable full feature auto-routing IBM PCB designer. Boards up to 32" x 32" with 6 layers. Output to pen plotter, photoplotter, dot-matrix printer or laser printer. Minimum requirements: IBM XT/AT compatible (286 or 386 processor) with 640k Ram and 10mb hard disc. CGA, EGA or VGA colour graphics adapter.

| | |
|---|---|
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P&P Free

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New 1000 series plotters at unbeatable prices! All with A3 paper handling 8 pens and 420mm/sec plotting speed. Parallel and serial interfaces and soft pen landing with automatic origin setting on all models. 1200 model has addition of electrostatic paper hold and X-Y coordinate display. 1300 model also has manual pen speed adjustment and a 1Mb buffer.

| | |
|---|---|
| DXY 880A | £560.00 |
| DXY 1100 | £675.00 |
| DXY 1200 | £890.00 |
| DXY 1300 | £1050.00 |

P&P £10.00

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## HOME ACCOUNTS

A brand new program from Pineapple offering the simplest solution to keeping track of all your home accounts. The program is unbelievably simple to use but still offers all the essential features such as automatic standing order handling, statement reconciliation etc. Any number of accounts may be stored on disc and transfers between accounts requires only a single operation. Available for Model 'B', Master and Compact with disc drive.

| | | |
|---|---|---|
| Home Accounts | £19.95 | P&P Free |

## DIAGRAM II

Still the only BBC drawing package to allow really large diagrams (up to 30 mode 0 screens DFS, 80 mode 0 screens ADFS) to be created. The unique scrolling and indexing system allows easy access to any part of the diagram, and the rapid line drawing routines enable diagrams to be produced very rapidly. The print routines provide unequalled flexibility with infinitely variable H & V scales and 90 deg. rotation if required. The smallest scale allows up to 18 mode 0 screens to be printed on an A4 sheet with clearly readable text, and full use can be made of wide carriage printers.
*'The quality of printing is the last factor which makes Diagram II so outstanding. The package really is capable of producing top quality diagrams.'*–ETI, March '88

| | | |
|---|---|---|
| Diagram II | £55.00 | P&P Free |

## ADFS Utilities Rom

ADU is an invaluable utility for all ADFS users. It adds over 22 new *commands to the ADFS filing system as well as providing an extensive Menu facility with over 35 sub commands covering areas such as repeated disc compaction, saving and loading Rom images, auto booting of files and many more. Transferring of files from DFS to ADFS is also made very easy with *DFSADFS.

| | | |
|---|---|---|
| ADU | £29.00 | P&P Free |

## MARCONI TRACKERBALLS

We now have an adapter available to link the trackerball to the Archimedes, to enable it to directly replace the Archimedes mouse.

| | | | |
|---|---|---|---|
| Bare Trackerball (no software) | £45.00 | For Model 'B' and 'B+' (with Icon Artmaster) | £59.00 |
| For Master 128 (with Pointer Rom) | £59.00 | Pointer Rom for Master 128 | £12.50 |
| Adapters to drive BBC Mouse software | £8.00 | Archimedes Adapter | £19.95 |

Trackerballs also available for other computers, please 'phone for details P&P on Trackerballs £1.75

## MITEYSPICE, SPICE.AGE and ECA-2

Three very powerful circuit analysis packages. Miteyspice is available for the BBC range of computers, and Spice.Age and ECA-2 for the IBM and compatibles. Spice.Age is a new product for the IBM range which provides facilities for transient and Fourier analysis as well as D.C. and Freq. response performance.

| | | | |
|---|---|---|---|
| Miteyspice (for BBC and Archimedes) | £119.00 | Spice.Age (IBM PC/XT/AT 512k Ram) | from £70.00 |
| ECA-2 (IBM PC/XT/AT 256k Ram) | £675.00 | LCA-1 (Logic Analyser for IBM's) | £350.00 |

P&P Free

VISA

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Access

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| 1-9 27128 250nS 12.5V | 3.22 | 3.70 |
| 10+27128 250nS 12.5V | 2.91 | 3.35 |
| 1-9 2764 250nS | 2.60 | 2.99 |
| 1-9 27256 250nS | 4.22 | 4.85 |
| 10+27256 250nS | 3.83 | 4.40 |
| 1-9 TTL/Cmos set | 3.91 | 4.50 |
| 1-9 8271 controller | 38.26 | 44.00 |
| 1-9 6264 LP 150nS | 8.00 | 9.20 |
| Acorn 8271 DFS | 45.22 | 52.00 |
| Acorn 1770 DFS | 45.22 | 52.00 |

## ROMS

| | Ex VAT | Inc VAT |
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| Inter-Word | 35.65 | 41.00 |
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| MEGA 3 | 71.30 | 82.00 |
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## MONITORS

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| Philips CM8852 | 251.30 | 289.00 |
| Philips BM7502 Green | 65.22 | 75.00 |
| Philips BM7522 Amber | 73.91 | 85.00 |
| Philips BM Stand | 7.78 | 8.95 |
| Philips TV Tuner | 56.52 | 65.00 |
| Taxan KX Amber | 82.61 | 95.00 |
| Taxan KX1201 Green | 60.00 | 69.00 |
| Microvitec 1451 | 221.74 | 255.00 |

(Prices inc. BBC Cable)

## MASTER/ARCH

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| Master 128K Micro | 346.95 | 399.00 |
| Archimedes 305 from | 599.13 | 689.00 |
| Master Compacts from | 294.78 | 339.00 |
| Turbo Upgrade | 98.78 | 113.50 |
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| A.R.M. Ass. Lang. Book | 12.00 | 12.00 |
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| Reference Manuals | 14.00 | 14.00 |
| View 3/View Sheet Guides | 9.00 | 9.00 |
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| Second user BBC B's available | | Phone |

## Philips CM8833

with BBC cable

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|---|---|---|
| Delta 14B single | 12.61 | 14.50 |
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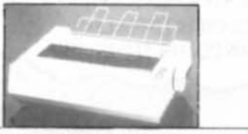
## Panasonic KXP1081



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| 1.5m (4 foot) BBC cable | 4.00 | 4.60 |
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| 10 Banana Reversible | 8.65 | 9.95 |
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# Odd one out

## *Just how quick-witted are you? Find out for yourself with Paul Chave's taxing teaser*

**THE game of Odd One Out has been popular for a lot longer than the BBC Micro has been about, but here's a two-player version that makes it just that bit more fun. The idea is to spot which item among a group of four does not have a characteristic common to the other three. Each player in turn has a go, scoring points depending on how quickly he answers.**

If the answer is correct he gets the points, otherwise they go to his opponent. There is a time limit too and if no answer is given before it expires the player loses double the amount. The points are added to a score bar which moves right or left depending on which player is winning, and when the end of the bar is reached that player has won a game. The match continues until one player becomes overall winner.

Type in the listing and ensure you've made no errors using Get it Right! Make sure you save it first, because on some machines the program relocates itself. Now just type RUN and away you go.

Only 13 questions are given in the listing but you can add as many as memory permits providing you use the correct format.

First give the list of items, then the number of the item that is the odd one out and finally the reason why – remember the program puts the words *Because the others* in front of each answer.

When choosing your own questions it is important to ensure they are unambiguous. For example, in this set:

```
Joystick
Mouse
Keyboard
Lightpen
```

Some possibilities are:

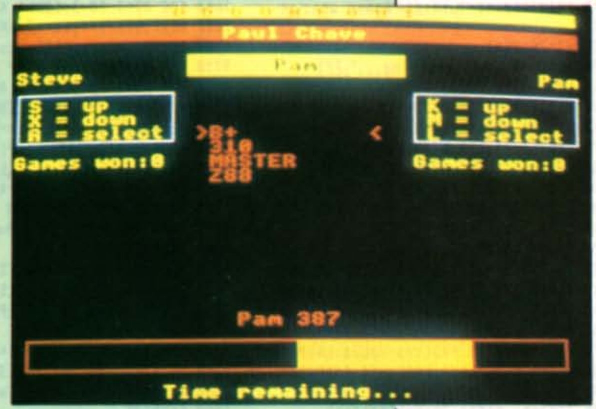
```
Mouse ..... because it uses a ball
Keyboard ...because it isn't an analogue
            input device
Lightpen ...because it uses light
```

However a better set would be:

```
Abacus
Micro
Knitting machine
Washing machine
```

Where the answer is the first item because the others operate using a stored program.

The best odd one out sets are composed of either items that are least like each other as possible – apart from the shared feature.



*Is the Z88 the odd one out?*

```
10 REM > OddOneOut
20 REM By Paul Chave
30 REM (c) The Micro User
40 MODE129:PROCreloc(&E00)
50 ON ERROR PROCerror
60 PROCcoff:*FX11
70 PROCtitle:PROCinit
80 REPEAT PROCscreen
90 REPEAT P%=(P%+1)MOD2
100 PROCsetup:PROCgame
110 UNTIL ABS(score)>=600
120 IF score>0 Q%=1 ELSE Q%=0
130 s%(Q%)=s%(Q%)+1
140 UNTIL FALSE:END
150 DEFPROCcoff
160 VDU23,1,0;0;0;0;0;:ENDPROC
170 DEFPROCtitle:LOCAL G%,Y%
180 ttl$="O D D O N E O U T"
190 aut$="Paul Chave"
200 DIM k$(1,3),s%(1),d$(3),o$(3)
210 FOR K%=1 TO 3:READ d$(K%)
220 FOR P%=0 TO 1
230 READ k$(P%,K%):NEXT:NEXT
240 Y%=512:VDU29,0;512;
250 FOR C%=1 TO 6:PROCscr(C%,Y%)
260 Y%=Y%-80:NEXT:QQ%=-1
270 COLOUR 130:COLOUR 0
280 PRINTTAB(12,15)ttl$
290 PRINTTAB(14,17)aut$
300 PRINTTAB(14,28)"Press space...";
310 REPEATUNTILGET=32:ENDPROC
320 DATA " = up",S,K," = down",X,M
330 DATA " = select",A,L
340 DEFPROCscr(C%,Y%)
350 LOCAL A%:GCOL 0,C%
360 FOR A%=0 TO Y% STEP 4
370 SOUND 17+A%MOD3,-7,A%DIV3,4
380 MOVE 0,A%:DRAW1279,A%
390 MOVE 0,-A%:DRAW1279,-A%
400 NEXT:ENDPROC
410 DEFPROCinit
420 PROCsquare(640,512,0,640,3)
430 PROCsquare(640,512,0,400,0)
440 FOR P%=0 TO 1
450 k$(P%,0)=FNgetname(P%):NEXT
460 PROCsquare(640,512,400,0,3)
470 PROCsquare(640,512,0,400,0)
480 COLOUR3
490 PRINTTAB(8,5)"INSTRUCTIONS:"
500 PROCinfo(0):PROCinfo(1)
510 PRINTTAB(8,20)"W = Sound on"
520 PRINTTAB(8,21)"Q = Sound off"
530 PRINTTAB(11,23)"Press space..."
540 REPEATUNTILGET=32
550 PROCsquare(640,512,400,0,3)
560 PROCsquare(640,512,0,640,0)
570 P%=1:ENDPROC
580 DEFPROCsquare(X%,Y%,J%,K%,C%)
590 LOCAL L%:GCOL0,C%:VDU29,X%;Y%;
600 FOR L%=J% TO K% STEP 4*SGN(K%-J%)
610 SOUND 17+L%MOD3,-7,L%DIV3,3
620 MOVEL%,L%:DRAWL%,-L%:DRAW-L%,-L%
630 DRAW-L%,L%:DRAWL%,L%:NEXT:ENDPROC
640 DEFFNgetname(N%):LOCAL N$,Y%
650 COLOUR128:COLOUR1:N%=N%+1:Y%=6*N%
660 PRINTTAB(8,Y%)"Player ";N%"'s name
";
670 COLOUR2:PROCcon
680 INPUTTAB(8,Y%+2)"=>"N$
690 PROCcoff:=LEFT$(N$,8)
700 DEFPROCcon
710 VDU23,1,1;0;0;0;0;:ENDPROC
720 DEFPROCinfo(P%)
730 LOCAL K%,X%,Y%:X%=8:Y%=(P%+1)*7
740 PRINTTAB(X%,Y%)k$(P%,0)
750 X%=X%+10:FOR K%=1 TO 3
760 PRINTTAB(X%,Y%+K%)k$(P%,K%)d$(K%)
770 NEXT:ENDPROC
780 DEFPROCscreen:VDU29,0;0;
790 COLOUR128:COLOUR3:CLS
800 score=0:lastscore=0
810 PROCgbox(2,0,991,1279,1023,1,ttl$)
820 PROCgbox(1,0,935,1279,967,2,aut$)
830 PROCbox(3,10,700,370,808)
840 PROCbox(3,900,700,1279,808)
850 COLOUR2:X%=1:Y%=6
860 PRINTTAB(0,Y%-1)k$(0,0)
```

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◀ From Page 79

```
 870 PRINTTAB(40-LENk$(1,0),Y%-1)k$(1,0
)
 880 FOR P%=0 TO 1:FOR K%=1 TO 3
 890 PRINTTAB(X%,Y%+K%)k$(P%,K%)d$(K%)
 900 NEXT:K%=K%+1
 910 PRINTTAB(X%-1,Y%+K%)"Games won:";s
%(P%)
 920 X%=29:NEXT
 930 PROCcn("Time remaining...",27)
 940 LX%=40:RX%=1240:HY%=64
 950 BY1%=192:TY1%=BY1%+HY%
 960 BY2%=4:TY2%=BY2%+HY%
 970 PROCbox(1,LX%,BY1%,RX%,TY1%)
 980 PROCbox(1,LX%,BY2%,RX%,TY2%)
 990 MX%=(LX%+RX%)/2:ENDPROC
1000 DEFPROCcn(t$,Y%)
1010 LOCAL X%:X%=(40-LENt$)/2
1020 PRINTTAB(X%,Y%)t$:ENDPROC
1030 DEFPROCgbox(C%,X%,Y%,x%,y%,c%,t$)
1040 GCOL0,128+C%:VDU24,X%;Y%;x%;y%;16
1050 GCOL0,c%:L%=LENt$*32
1060 MOVE (x%+X%-L%)/2,(y%+Y%)/2+12
1070 VDU5:PRINTt$:PROCsep:VDU26:ENDPROC
1080 DEFPROCsep:VDU4:PROCcoff:ENDPROC
1090 DEFPROCsetup
1100 Z%=RND(-TIME):Z%=RND(ABSRND)
1110 RESTORE 2130:READ N%
1120 REPEATQ%=RND(N%):UNTILQ%<>QQ%
1130 QQ%=Q%:FOR A%=1 TO QQ%
1140 FOR O%=0 TO 3:READ o$(O%)
1150 NEXT:READ R%,r$:NEXT:ox%=1
1160 PROCwind(2,TRUE):PROCwind(1,TRUE)
1170 FOR Z%=0 TO 10:PROCwait(30)
1180 PROCgbox(Z%,400,848,879,896,Z%+2,k
$(P%,0))
1190 NEXT:PROCwind(1,TRUE)
1200 FOR O%=0 TO 3
1210 PRINTTAB(ox%,O%)o$(O%)
1220 NEXT:R%=R%-1:ENDPROC
1230 DEF PROCwind(W%,C%):VDU26
1240 IF W%=1 VDU28,13,13,26,9
1250 IF W%=2 VDU28,0,18,39,14
1260 IF C% CLS
1270 ENDPROC
1280 DEFPROCbox(C%,X%,Y%,x%,y%)
1290 GCOL0,C%:MOVE X%,Y%:DRAW X%,y%
1300 DRAW x%,y%:DRAW x%,Y%
1310 DRAW X%,Y%:ENDPROC
1320 DEFPROCwait(T%):T%=TIME+T%
1330 REPEAT UNTIL TIME>T%:ENDPROC
1340 DEFPROCgame
1350 timeout=0:done=0:time=0
1360 C%=RND(4)-1:PROCcurs(1,ox%,C%)
1370 REPEAT:G$=CHR$(INKEY0AND&DF)
1380 IF G$=k$(P%,1) PROCup
1390 IF G$=k$(P%,2) PROCdown
1400 IF G$=k$(P%,3) done=TRUE
1410 IF G$="Q" THEN *FX210,1
1420 IF G$="W" THEN *FX210,0
1430 time=time+4:PROCwait(3)
1440 PROCline2(time,2+(time<1000))
1450 UNTIL time>1188 OR done
1460 IF done PROCselect ELSE PROCtimeup
1470 PROCscore:ENDPROC
1480 DEF PROCline2(O%,C%):GCOL 0,C%
1490 MOVE LX%+O%,BY2%+4:PLOT 1,0,HY%-8
1500 ENDPROC
1510 DEFPROCcurs(C%,X%,Y%):X%=X%-1
1520 LOCAL a$,b$:a$=" ":b$=" "
1530 IF C%=1 a$=">":b$="<"
1540 PRINTTAB(X%,Y%)a$TAB(X%+12,Y%)b$
1550 ENDPROC
1560 DEFPROCup:PROCcurs(0,ox%,C%)
1570 C%=C%-1:IF C%<0 C%=3
1580 PROCcurs(1,ox%,C%):ENDPROC
1590 DEFPROCdown:PROCcurs(0,ox%,C%)
1600 C%=(C%+1)MOD4:PROCcurs(1,ox%,C%)
1610 ENDPROC
1620 DEFPROCselect
1630 IF C%=R% PROCright ELSE PROCwrong
1640 done=TRUE:ENDPROC
1650 DEFPROCright
1660 PROCmess(3,"CORRECT!!")
1670 FOR N%=53 TO 69 STEP 8
1680 FOR A%=1 TO 3:SOUND A%,-15,N%,5
1690 NEXT:NEXT:right=+1:ENDPROC
1700 DEFPROCwrong:PROCmess(1,"WRONG!!")
1710 FOR N%=53 TO 37 STEP -8
1720 FOR A%=1 TO 3:SOUND A%,-15,N%,5
1730 NEXT:NEXT:right=-1:ENDPROC
1740 DEFPROCtimeup:right=-2
1750 PROCmess(2,"TIME'S UP!!"):ENDPROC
1760 DEFPROCmess(C%,t$):CLS:COLOUR C%
1770 PRINTt$:PROCwind(2,FALSE)
1780 PRINT"The ODD ONE OUT was "o$(R%)
1790 PRINT"Because the others "r$
1800 ENDPROC
1810 DEFPROCscore:LOCAL J%,K%,T%
1820 IF P%=0 S%=-right ELSE S%=right
1830 FOR T%=time TO 4 STEP-4
1840 PROCline2(T%,0):NEXT
1850 VDU26:score=score+S%*(1200-time)/4
1860 IF S%<0 PROCgLeft ELSE PROCgRight
1870 lastscore=score:PROCwait(150)
1880 ENDPROC
1890 DEF PROCgLeft
1900 FOR K%=lastscore TO score STEP -4
1910 PROCline1(K%,K%<0):NEXT:ENDPROC
1920 DEF PROCgRight
1930 FOR K%=lastscore TO score STEP 4
1940 PROCline1(K%,K%>0):NEXT:ENDPROC
1950 DEFPROCline1(T%,C%)
1960 IF T%<0 N%=0 ELSE N%=1
1970 t$=" "+k$(N%,0)+" "+STR$ABST%+" "
1980 PROCcn(t$,22)
1990 IF ABST%>=600 ENDPROC
2000 IF T%>0 C%=ABSC%*1 ELSE C%=ABSC%*2
2010 IF C%>0 C%=C%-((T%AND4)>0)
2020 GCOL 0,C%:MOVE MX%+T%,BY1%+4
2030 PLOT 1,0,HY%-8:PROCwait(1):ENDPROC
2040 DEFPROCerror:*FX12
2050 VDU26,12:PRINT:REPORT
2060 PRINT" at line ";ERL:END
2070 DEFPROCreloc(Q%):P%=PAGE:L%=TOP-P%
2080 IF P%<=Q% OR HIMEM>&3000 ENDPROC
2090 PRINT"Relocating...":*TAPE
2100 FORM%=0TOL%STEP4:Q%!M%=P%!M%:NEXT
2110 *K.0"PAGE=Q%|MOLD|MRUN|M"
2120 A%=138:X%=0:Y%=128:CALL&FFF4:END
2130 DATA 13
2140 DATA ELITE,REPTON,SUPERMAN,GALAFOR
CE,3,are by Superior Software
2150 DATA RED,YELLOW,GREEN,BLUE,3,are p
rime colours
2160 DATA B+,310,MASTER,Z88,4,are BBC M
icros
2170 DATA CAT,COW,DOG,MOUSE,2,are commo
n pets
2180 DATA FORD,RALLY,BANGER,STOCK CAR,1
,are races
2190 DATA RADIO,BOOK,TOASTER,LAMP,2,use
 electricity
2200 DATA LOG,WROUGHT,PIG,CAST,1,can al
l precede the word IRON
2210 DATA MELON,ORANGE,LEMON,PLUM,4, ha
ve pips
2220 DATA POTATO,TOMATO,PEAS,CARROTS,2,
are vegetables
2230 DATA HAZEL,OAK,PINE,BEECH,3,have l
eaves
2240 DATA CALOR,PROPANE,BUTANE,IGNIT,4,
are gases
2250 DATA OAK,PINE,MAHOGANY,BEECH,2,are
 hardwoods
2260 DATA SNAIL,DEER,SHARK,PIG,3,are fa
rmed
```

## Get it right!

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = B284 4
  50 = 9621 9
  60 = 5E46 D
  70 = BA84 E
  80 = 8DF5 6
  90 = BDD1 E
 100 = 1E99 3
 110 = B226 1
 120 = A55B B
 130 = DC9B 1
 140 = DADE D
 150 = 499A D
 160 = E0BA 8
 170 = 329D 5
 180 = C1F4 6
 190 = 9E0D 2
 200 = 4151 B
 210 = BD6D 6
 220 = 4880 A
 230 = 7736 E
 240 = FE77 3
 250 = 74A1 3
 260 = 82FB 0
 270 =   80 7
 280 = B7D3 F
 290 = 7C13 3
 300 = DD45 4
 310 = 54BD 6
 320 = 2A3D 0
 330 = 79E7 5
 340 = C585 7
 350 = 8CA1 B
 360 = 3197 A
 370 = 315C C
 380 = 5A72 D
 390 = 6AD4 6
 400 = E531 3
 410 = 344C 7
 420 = D384 9
 430 = 8491 4
 440 = 4880 B
 450 =  4CE 1
 460 = 326F A
 470 = 8491 1
 480 = C90B F
 490 = 42C9 C
 500 = 48E5 5
 510 = 8420 A
 520 = 8600 F
 530 = 93C1 0
 540 = 5B81 8
 550 = 326F 1
 560 = 86D7 0
 570 = BBDC 8
 580 = E815 D
 590 = 8A98 E
 600 = 68F8 2
 610 = 6257 6
 620 = 15F2 3
 630 = AA2D 0
 640 = 33F8 6
 650 = 6922 4
 660 = 630E 0
 670 = AC59 8
 680 = C67E A
 690 = 2434 B
 700 = 30FA A
 710 = E3CF 8
 720 =  369 3
 730 = 873D 8
 740 = 80EB 3
 750 = 7C60 2
 760 = 577A 1
 770 = E531 B
 780 = 751F F
 790 = CDD2 8
 800 = 1504 0
 810 = BCB9 1
 820 = 2C6D 2
 830 = 7241 F
 840 = CA79 5
 850 = 1D4B B
 860 = FC10 6
 870 = 70C6 F
 880 = D69D 9
 890 = 577A 0
 900 = E281 3
 910 = C9B9 F
 920 = 7ECF E
 930 = 4C02 7
 940 = 25CF A
 950 = 5665 A
 960 = 7CDB 3
 970 = 6BD4 B
 980 = 371B 8
 990 = 2E4B 7
1000 = 5B9A 2
1010 = 7605 9
1020 = 7292 C
1030 = E8A8 E
1040 = 1F3D 0
1050 = 4C2F F
1060 = 26F0 F
1070 = 7704 1
1080 = 794C 2
1090 = 2AA8 5
1100 = B494 F
1110 = 4581 9
1120 = 9A9D C
1130 =  A2B 0
1140 = 9AE6 B
1150 = 4D38 A
1160 = C2F7 9
1170 = 4BEE 8
1180 =  B80 7
1190 = B05A 5
1200 = 8CB4 D
1210 = F8DA 2
1220 = 14F5 2
1230 =  E8F 5
1240 = 1790 7
1250 = 9B35 6
1260 = AF4B 4
1270 = ED0F 2
1280 = 7AF3 3
1290 = 76DD 0
1300 =  51F 1
1310 = 302E 9
1320 = 32E8 6
1330 = B6C9 8
1340 = 74F3 7
1350 = 5AE8 E
1360 = AA5E 3
1370 = CA37 9
1380 = 1D6B E
1390 = 7E70 1
1400 = 9D69 4
1410 = ACD5 D
1420 = 339F D
1430 = 9573 6
1440 = 3470 5
1450 = C063 5
1460 = 294F 7
1470 = ABC2 F
1480 = 5383 9
1490 = B90A 8
1500 = ED0F 1
1510 = 8911 6
1520 = FB96 2
1530 = 96BA 1
1540 = ED64 2
1550 = ED0F 4
1560 = A369 7
1570 = 41B9 F
1580 = 4D50 7
1590 =   4B 9
1600 = 6EF6 D
1610 = ED0F 1
1620 = 981C 6
1630 = C105 9
1640 = 2C46 7
1650 = E053 0
1660 = CA2C B
1670 = 499F 7
1680 = 3006 7
1690 = 240A 1
1700 = 2618 A
1710 = F434 9
1720 = 3006 0
1730 =  393 F
1740 = 92E3 3
1750 = 6A2C F
1760 = A3A6 9
1770 = 903B B
1780 = 47A6 0
1790 = 1BC3 A
1800 = ED0F 2
1810 = A66D 4
1820 = AD68 4
1830 =  F0E E
1840 = 4C88 5
1850 = 80D7 5
1860 = 403C 4
1870 = C520 7
1880 = ED0F 9
1890 = A429 4
1900 = 1CCC 7
1910 = 9F16 9
1920 = 1793 A
1930 = FFCD 9
1940 = FFF5 9
1950 = 9456 2
1960 = 3F1C B
1970 = B3B1 2
1980 = 1926 0
1990 =  CFD 3
2000 =  A43 A
2010 = 77C7 0
2020 = 4A3A 8
2030 = 69B7 6
2040 = 580E B
2050 = E69B A
2060 = 65A1 B
2070 = CFA5 F
2080 = F7B9 A
2090 = E778 0
2100 =  20D A
2110 = 199F 0
2120 = FCE9 1
2130 = 5163 3
2140 =  8B1 0
2150 = 31BA A
2160 = CCFD C
2170 = 9A30 9
2180 = 8EDB E
2190 = 59B6 F
2200 =  ED6 4
2210 = A4C2 A
2220 = 3649 0
2230 = 5107 A
2240 =  1AE E
2250 = 9D40 D
2260 = AF9D B
```

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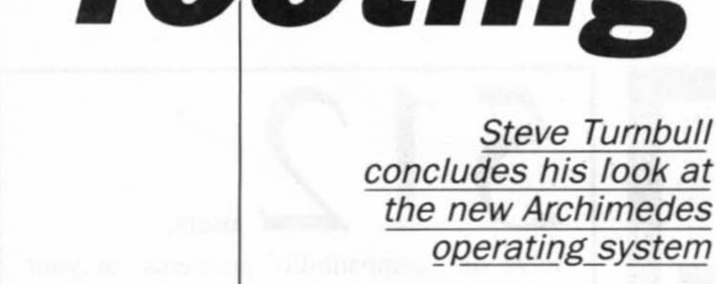
# !Boot on the other footing

*Steve Turnbull concludes his look at the new Archimedes operating system*



*The !Draw applications directory*

**OVER the past few months we have been looking at the software you get when upgrading to the Risc OS for the Archimedes – remember within a couple of months no software house will be supporting the old Arthur 1.2, so it's best to take advantage of Acorn's special price now. Here we'll look at some of the advances that make the Risc OS such a truly remarkable operating system by looking at the boot up procedure:**

On the 8 bit BBC Micros boot files only existed in the $ directory – whether DFS or ADFS – and on receiving a Shift+Break the filing system loads, executes or runs the file called !boot. On the Risc OS, however, the situation is different. Although compatibility has been maintained, !boot files may also exist in sub-directories, where they take on a whole new meaning.

To refresh your memory: If a directory has a name beginning with *!* it is called an application, and it can be run by double clicking its icon from a directory window. When a disc is accessed for the first time any application directories are examined and the following actions performed:

- If a file called !boot is found it is executed, so it can contain commands to set up any important operating system variables. Some applications also load sprites into the common sprite pool using the *IconSprites command.
- If a file called !Sprites exists it is examined for a sprite that goes by the same name as the directory used as the icon for the application in the directory window. Sometimes a smaller version of the sprite is wanted and it can be included as sm!name.
- Double-clicking an application icon causes a file called !Run to be executed. By convention it carries out certain actions, like setting up the directory path for itself, and then passes control to the main program, normally called !RunImage.

One of the major aims during the development of all BBC Micros has been to make all application, or end-user, filing operations the same regardless of whether you're using tape, DFS, ADFS, Net or any other standard system. This has resulted in unprecedented compatibility between different models.

However one problem arose with the ADFS and Net. Let's say we have an application called !MyProg sitting in the top level of its original disc with several data files held in a sub-directory called Data. The original programmer knows that the data files can be found in $.!MyProg.Data and can use this path when loading data.

But after buying it we want to put it on our own disc in a directory called Apps. Now the correct path for the data files is $.Apps.!MyProg.Data – so the programmer's original assumption is now incorrect and the program can't work.

The Acorn software designers thought of this one even on the original ADFS, and allowed the use of @ to represent the current directory regardless of what it actually was, so the programmer could refer to @.!MyProg.Data. But this still isn't perfect, because you still need to issue a *DIR $.Apps before it will work correctly.

On the Archimedes there is an option to create variables that are held by the operating system –

this, in association with the new Obey module, provides the key to this portability problem. Obey executes text files containing star commands which can be nested to any depth if necessary. But additionally, when it is invoked the filing system supplies the complete path of the file being presented for execution which the module then puts into a variable called Obey$Dir.

The upshot of this is that you get !Run files that look like this:

```
| My program version 1.00
Set MyProg$Dir <Obey$Dir>
WimpSlot -min 32k -max 32k
Run <MyProg$Dir>.!RunImage
```

The first line is a comment while the second creates a new variable *MyProg$Dir* that contains the complete path to the application !MyProg regardless of where it is when double-clicked. A sample might be:

```
adfs::MyDisc.$.Apps.!MyProg
```

Notice how the path contains, not only the directories, but the filing system and the disc names. The WimpSlot command informs the Wimp about how much memory to allocate to the next multi-tasking program that installs itself. The final line illustrates how the path variable can be used to run the main program. While within that you might get a line like:

```
DIM data &1000
OSCLI("LOAD <MyProg$Dir>.Data.File1 "+STR$~data)
```

which would always work correctly. If you are using a ram disc you might get:

```
:ram.$.!MyProg
```

as the path.

This is completely transparent to the person using the program – he or she never knows how much complexity is involved in making the system so simple to use.

If you look at the screen shot of the !Draw sprites you can see file_aff and small_aff, which are the icons for the data files that !Draw creates – DrawFiles. These are loaded into the common sprite pool and when a directory window is opened an attempt is made to match file types to sprites. Where no match is found a blank white box is used instead.

If an application has its own data files the !boot files need to do one more thing – specify what actions need to be undertaken if the data file is double-clicked rather than the application itself. Let's say !MyProg uses data files with a type of &200 and called MyData – you can have up to eight characters.

!Sprites needs a sprite called file_200 – and perhaps small_200 and !Boot needs these extra lines:

```
Set File$Type_200 MyData
Set Alias$@LoadType_200 Run <Obey$Dir>.!Run %%*0
Set Alias$@RunType_200 Run <Obey$Dir>.!Run %%*0
```

The first command defines what text is associated with a given file type – you can even use these from simple Basic programs just to ensure you never load the wrong sort of data.

The other lines are more complex: They define what to do if a data file with type 200 is *LOADed or *RUN. In both cases we want the operating system to load !MyProg from whatever directory it was in when the !boot file was found and make !MyProg load the data file. <Obey$Dir> is replaced by the path when the variable is created.

When a load or run command is issued a variable name is constructed by the filing system, for example:

```
Alias$@RunType_200
```

and this is matched against the operating system variables. If it is not found you get an error message like *No run action specified for this file type.* When it is found the variable is evaluated and issued to the command line interpreter:

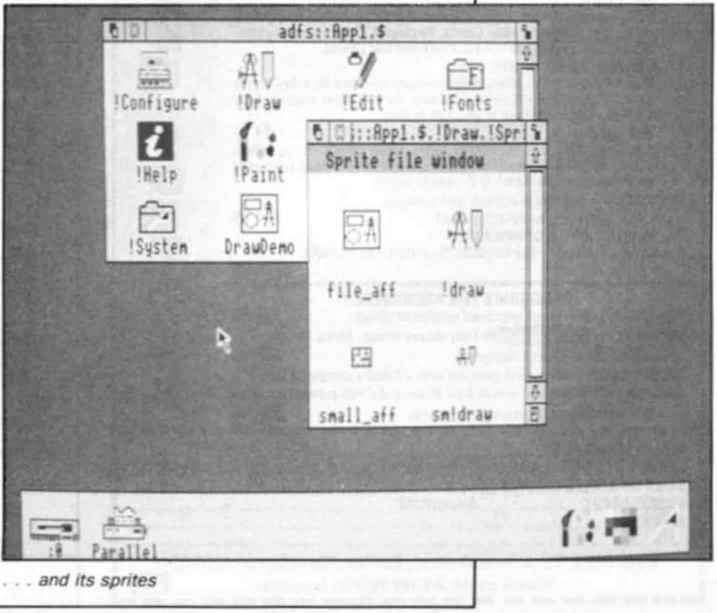
```
Run adfs::MyDisc.$.Apps.!MyProg.!Run MyData
```

This may seem very longwinded, but it provides tremendous flexibility and, most importantly, compatibility with older software.

On a single drive system you can get a lot of disc swapping if applications and data are scattered across various discs. One way around this is to put all the applications and associated files that you need for a particular task on one disc and do a hard break between jobs.

With dual drives you can keep general applications on a system disc and keep data on separate discs. With a hard disc everything is kept on it, so you get no problems – and it's very much faster to load applications and data.

● *That completes our introductory series to the Risc OS. If you have any questions about particular aspects write in and we'll do our best to answer them.*



. . . and its sprites

## Availability

**This series of articles has been written using a preview version of the Risc OS available in April. Also the disc software has not been finalised.**

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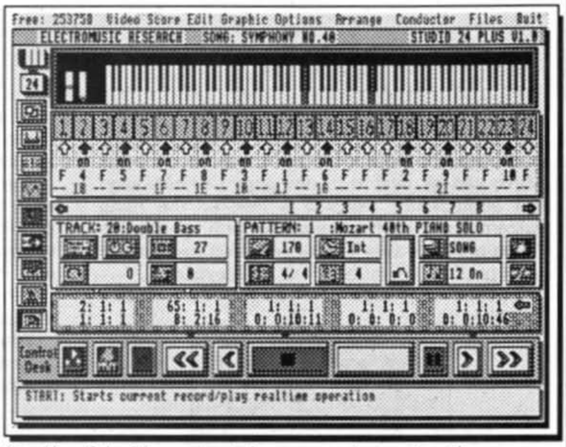
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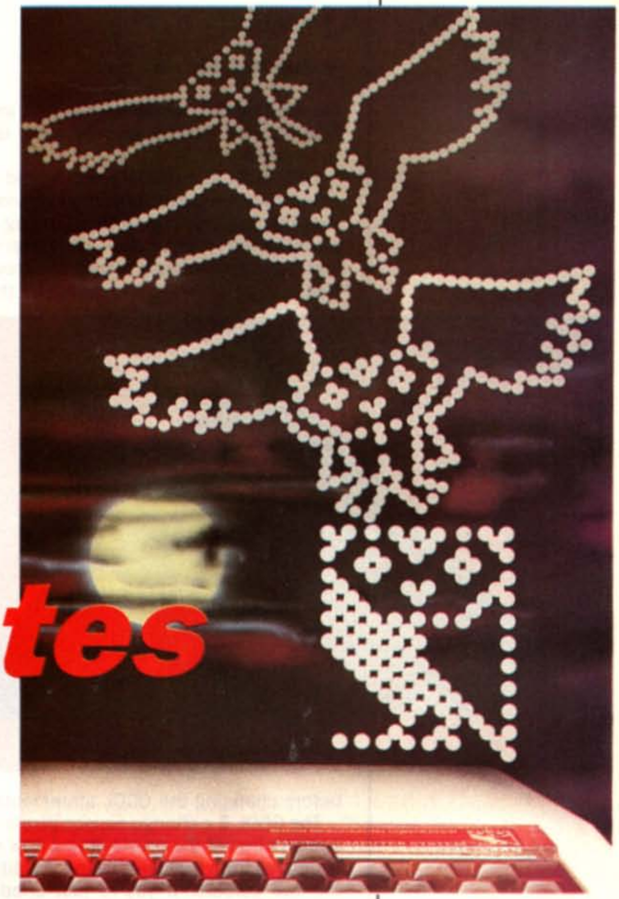
*Eric Crisp continues his series on the technique of producing really snappy micro animation*

# Spritely colour coordinates



**LAST month we got a ball moving smoothly and with flicker-free animation, but when it moved across a coloured or patterned background our technique didn't work too well. What happened was that the ball erased the background as it passed – not a good idea for an exciting, colourful and action-packed game. However, this problem can be solved easily by changing the method of drawing and rubbing out the ball.**

What we have to do is change the two GCOL statements on line 25 from GCOL 0,0 and GCOL 0,3 to GCOL 3,3 in both cases. Your program should now look something like this:

```
10 MODE 1:VDU 23,1,0;0;0;0;
12 COLOUR 129:CLS:GCOL 0,2
13 MOVE 0,100:MOVE 600,800:PLOT 85,1200,100
15 K%=0:VDU 5
20 FOR I%=1 TO 60
25 MOVE K%*8,380:GCOL 3,3:PRINT"O"
30 MOVE I%*8,380:GCOL 3,3:PRINT"O"
35 *FX19
40 FOR J%=1 TO 50:NEXT
45 K%=I%
50 NEXT
```

Hey presto – the background is not affected by the passage of the ball. But wait a minute, what's happened to the ball's colour? And now there's a second, stationary, one as well. Consideration of how objects are displayed on the screen may help to explain these effects.

The picture is made up of coloured dots called pixels, each of which is defined by one or more bits in the screen memory. A bit is a *bin*ary dig*it* – each byte of memory contains eight bits.

The number of bits associated with each pixel depends on the screen mode being used: In Mode 1, for instance, there are two bits for each pixel. For simplicity, we'll only consider a Mode 1 screen.

The four colours correspond to specific binary values:

| Colour | Binary |
|---|---|
| 0 | 00 |
| 1 | 01 |
| 2 | 10 |
| 3 | 11 |

If the value of the bits associated with a specific pixel are changed its colour is altered accordingly.

On a blank Mode 1 screen all the pixels are black – colour zero – because all the bits are zero. When a bit pair is changed to 11, the corresponding pixel becomes white – colour 3. Print statements cause groups of bit pairs to change.

"Very interesting", you might think. "What's that got to do with changing GCOL statements?" Patience, we're nearly there – we just need to see how PRINT creates coloured characters.

When something is printed at the graphics cursor – following a VDU5 command – pixels undergo a colour change determined by the last GCOL statement, which consists of the command

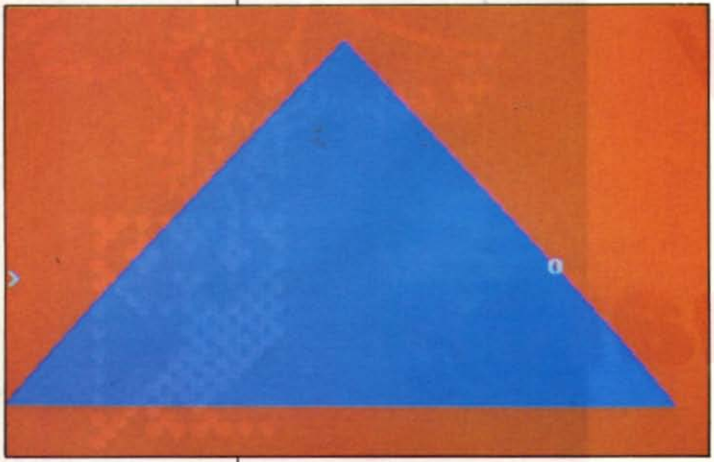
Turn to Page 86 ▶

> *The number of bits associated with each pixel depends on the screen mode being used*

◄ *From Page 85*

followed by two numbers – the first indicates the type of colour change and the other is the colour to be used.

With GCOL 0,c pixels are changed to the specified colour regardless of their previous one. For example, characters printed using GCOL 0,1 would be red – colour one – no matter what colour was there before. As a result, the previous one is lost – this is what happened in the program before changing the GCOL statements.



The GCOL 3,c change causes pixels to alter to a combination of the previous and new colours and is derived from Exclusive ORing the bit patterns of the two colours. If you've just cried "Exclusive whatting?" see the adjacent panel.

Let's see how Exclusive ORing affects colours: Suppose printing is done – in Mode 1 – using a GCOL 3,1 statement – remember colour one is red and has the bit pattern 01. Each pixel affected will have its existing colour – bit pattern – Exclusive ORed with 01. The table shows what happens for each of the four possible cases:

| **Pixel Colour** | **Bit Pattern** | **Red Pattern** | **Result Pattern** | **Result Colour** |
|---|---|---|---|---|
| Black | 00 | 01 | 01 | Red |
| Red | 01 | 01 | 00 | Black |
| Yellow | 10 | 01 | 11 | White |
| White | 11 | 01 | 10 | Yellow |

As you can see, the result depends on the existing colour. The next table shows the situation for Exclusive ORing with white using GCOL 3,3:

| **Pixel Colour** | **Bit Pattern** | **White Pattern** | **Result Pattern** | **Result Colour** |
|---|---|---|---|---|
| Black | 00 | 11 | 11 | White |
| Red | 01 | 11 | 10 | Yellow |
| Yellow | 10 | 11 | 01 | Red |
| White | 11 | 11 | 00 | Black |

This shows that the result depends on the Exclusive OR colour as well as the original. Also note that the result Exclusive ORed with the same colour returns the original again. For example, red Exclusive ORed with white gives yellow and this Exclusive ORed with white again gives red.

We can now explain the effect of using GCOL 3,3 in our program:

- Maintaining the background works by using GCOL 3,3 to print the ball so that the background is remembered and then restored by still using GCOL 3,3 to reprint the ball in the same position.
- The unfortunate change in colour of the ball is a side effect of GCOL 3 because the result is affected by the colour previously there.
- The extra ball is a programming fault because the first time through the main loop the ball is rubbed out – line 25 – before one exists. Rubbing out is done in the same way as putting one there, hence an extra ball.

The extra ball is easily handled by printing a ball ready for rubbing out by inserting the line:

```
18 MOVE K%*8,380:GCOL 3,3:PRINT"O"
```

The unfortunate colour change is not so easy to rectify, though it can be handled by redefining colours using VDU 19. If you need to brush up on that read the panel on the following page.

The program uses two background colours – red and yellow – and one colour for the ball – white. Suppose one of the bits in the colour pattern is used to indicate when the pixel is forming part of the ball, say the left bit, then patterns 10 and 11 – colours two and three – would need to be defined as white. This would leave colours 0 and 1 – 00 and 01 – for the red and yellow background.

To ensure that the left bit is one when the ball is on a pixel and zero when it isn't, you can print it using GCOL 3,2. This works because the background will have patterns of 00 and 01 – colours zero and one – so that when Exclusive

## EXCLUSIVE OR

Exclusive OR is a logical operation carried out on binary numbers. Basically, the operation compares corresponding bits of two binary numbers giving the result zero if the bits are the same and one if they are different.

As an example, if we Exclusive OR 1100 with 0110 the result would be 1010 as follows:

```
First number  1 1 0 0
Second number 0 1 1 0
              -------
Result        1 0 1 0
```

Another way of looking at this is to consider the result to be the first number but with bits inverted – zero to one and one to zero – if they are in the same position as a one in the second number.

Looking at it this way leads to an interesting result: If the first number is Exclusive ORed twice with the second number you end up with the first number again because those bits inverted the first time will be inverted to their original value the second time.

Using the example above, we do a new Exclusive OR:

```
Old result       1 0 1 0
Second number    0 1 1 0
                 -------
ORiginal number  1 1 0 0
```

Try a few of your own until you get the hang of it.

ORed with 10 – colour two – the result is 10 or 11, colours two and 3.

Now let's incorporate these ideas into the program. First define colours zero and two to be yellow and white – one and three are red and white by default – by inserting line 11 like this:

```
11 VDU 19,0,3;0;:VDU 19,2,7;0;
```

The triangle must be drawn in colour 0, as this is now yellow. So change GCOL 0,2 to GCOL 0,0 on line 12. The ball should be printed using GCOL 3,2, so change the GCOL 3,3 statement in line 18 to GCOL 3,2 and remove them from lines 25 and 30.

After trying the program, you should notice that the white ball does not stand out against the yellow background. Just change colour zero to blue by changing line 11 to the following:

```
11 VDU 19,0,4;0;:VDU 19,2,7;0;
```

At last we have it – a super-smooth, clear and colour-coherent moving ball, though it's still not particularly enthralling. Was it worth it? Well, you've just made a simple sprite, so yes, it was. A sprite is an animated object that is unaffected by the background.

● *We'll leave it there for now as there's quite a bit of theory to digest. Next month we'll go a stage further and animate our sprite to make it even better.*

## REDEFINING COLOURS

Bit patterns in the screen memory are used to represent colours but the actual colour associated with a particular one is handled by the video display circuitry and can be changed using the VDU 19 command.

For example, VDU 19,0,4;0; changes colour zero – normally black – to blue, try it in Mode 1. The first number following VDU 19 corresponds to the colour as used in COLOUR and GCOL statements and the second represents the actual colour to be displayed. The list below shows the actual colours and the associated numbers:

| | | | |
|---|---|---|---|
| 0 | Black | 8 | Black/White |
| 1 | Red | 9 | Red/Cyan |
| 2 | Green | 10 | Green/Magenta |
| 3 | Yellow | 11 | Yellow/blue |
| 4 | Blue | 12 | Blue/Yellow |
| 5 | Magenta | 13 | Magenta/Green |
| 6 | Cyan | 14 | Cyan/Red |
| 7 | White | 15 | White/Black |

The second group of eight colours are the ones that flash and they're not very useful except for special effects and re-defining as non-flashing.

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Plus differentiation and integration of all the usual 'Standard Forms'.

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- A wide range of variables (x,y,z,...) ● The 'exponential' constant e, ● Any of the following functions:-

| | | | | | |
|---|---|---|---|---|---|
| SIN | COS | TAN | SEC | COSEC | COT |
| SINH | COSH | TANH | SECH | COSECH | COTH |
| ARCSIN | ARCCOS | ARCTAN | ARCSEC | ARCCOSEC | ARCCOT |
| ARCSINH | ARCCOSH | ARCTANH | ARCSECH | ARCCOSECH | ARCCOTH |
| LN | | | | | |

For example, a standard problem might be to differentiate SIN(COS(6ax+1)), or, harder, to integrate ARCTAN(x).

Just like a human expert, if one technique doesn't solve the problem, then alternative methods will be tried, and the software makes effective, intelligent choices.

Shows how to utilise principles from algebra and trigonometry, such as Reciprocals, the rules of Indices, the laws of Logarithms and various identities.

### DID YOU KNOW

Pythagoras, born 569 BC, was the founder of a secret cult based on mathematics and mysticism.

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B B+ M

# Yahtzee!

*Daniel Wagenaar and Steven de Rooy present an ancient game with modern lasting appeal*

**PASTIMES from the mysterious East always seem to be the most durable, and one of the most popular recently has been the dice game Yahtzee. You can play it with just five dice and a scrap of paper, but lots of enhancements have been added including printed forms and automatic dice throwers. Now you can use your BBC Micro to play this compulsive game.**

The idea is quite simple: You have a set of 13 combinations to be matched by throwing the dice. You can roll them a maximum of three times to try and form one of the set of specified sequences shown.

First throw all five and see if you've made – or nearly made – a match. Hold back those dice you want to keep and re-roll the others. Check again and re-roll another time if you want to.

Now enter a score on one of the combination lines – usually the highest you can make, but this is not always the best. If you haven't made any match, or the best line for your throw has already been filled in, you still need to mark one even if it is zero.

A bonus of 35 is added to your score if the total in the upper section exceeds 65. This value is based on you getting three 1s, three 2s and so on, which means that if, for example, you only score two 1s and two 2s you will still be able to get the bonus as long as you make up the difference – with, say, four 3s.

When all 13 lines have been completed the game is over and you compare scores. The table shows the combinations you are trying to achieve, what they mean and the score given.

The listing is quite short, so type it in and ensure you've made no mistakes using Get it Right! You must save the program before running it because it relocates itself, and if you've made any errors you could lose the whole thing.

When you run the program the screen display is set up and you enter the names of the two players. The first one presses the spacebar to roll the dice. When they stop rolling pressing keys one to five will hold – or release – the appropriate dice and pressing the spacebar starts them again. Put hold on all of them if you are happy with what you've got.

Once you are satisfied, or you've used up the three rolls, one of the free lines is highlighted in your panel. Use the up and down cursor keys to see what each line scores with your roll and when you've chosen the one you want press Return.

Continue alternating players until all 13 lines have been filled. Then the final score is displayed. Press any key to play again.

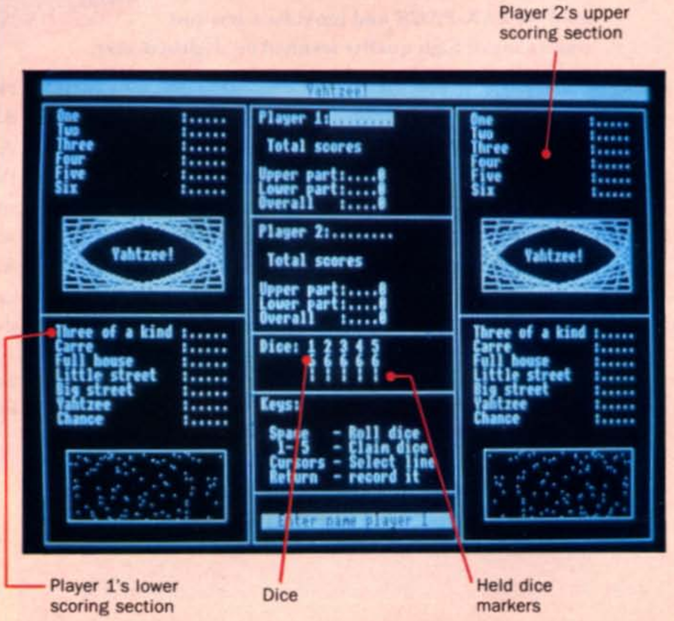
Although it involves a lot of luck Yahtzee demands considerable skill when choosing which line scores the most – or gives you better scoring opportunities in the future. Best of luck.

**Turn to Page 109 ▶**

| **Name** | **Score** | **Match if hand contains** |
|---|---|---|
| One | 1..5 | Ones |
| Two | 2..10 | Twos |
| Three | 3..15 | Threes |
| Four | 4..20 | Fours |
| Five | 5..25 | Fives |
| Six | 6..30 | Sixes |
| Three of a kind | Hand total | At least three dice of the same value |
| Carre | Hand total | At least four dice of the same value |
| Full House | 25 | Three dice of one value, two of another |
| Little street | 30 | Four dice in sequence |
| Big street | 40 | Five dice in sequence |
| Yahtzee | 50 | All dice the same value |
| Chance | Hand total | Any combination |

*Any roll can be placed on any line, but scores zero if there is no match*

*Scoring in Yahtzee*



```
                    Yahtzee!
One            :.....   Player 1:.........   One            :.....
Two            :.....    Total scores        Two            :.....
Three          :.....                        Three          :.....
Four           :.....   Upper part:....0     Four           :.....
Five           :.....   Lower part:....0     Five           :.....
Six            :.....   Overall   :....0     Six            :.....

     Yahtzee!           Player 2:.........        Yahtzee!
                         Total scores

                        Upper part:....0
                        Lower part:....0
                        Overall   :....0

Three of a kind :.....  Dice: 1 2 3 4 5      Three of a kind :.....
Carre           :.....        6 6 6 6 6      Carre           :.....
Full house      :.....        ! ! ! ! !      Full house      :.....
Little street   :.....                       Little street   :.....
Big street      :.....  Keys:                Big street      :.....
Yahtzee         :.....                       Yahtzee         :.....
Chance          :.....   Space   - Roll dice Chance          :.....
                          1-5    - Claim dice
                         Cursors - Select line
                         Return  - record it

                        Enter name player 1
```

Player 2's upper scoring section
Player 1's lower scoring section
Dice
Held dice markers

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## L I G H T

**The scanner, interface & software for the Archimedes**

## The Hardware

**Scan-Light is based around the scanner interface used for FAX-PACK and provides a low cost way to input high quality scanned or 'digitised' text and pictures into the Archimedes.**

Scan-Light consists of a half-width expansion board (that will fit into any Archimedes), on board ROM software and an 8.5 inch 200 dpi scanner.

The hand-held scanner will scan pictures or text from loose pages, photographs and books, and because of its full A4 width it will scan complete A4 pages of text or pictures up to 8.5 by 11.5 inches in size. As such, it is far more flexible and useful than other 'half- width' scanners. The scanner also has a brightness control to cater for a range of document contrasts.

Scanning a picture is simple; the scanner is placed at the top of the picture, a menu option is chosen and the scanner is just rolled over the page. The scanner interface ensures the picture is scanned accurately at 200 dots per inch, irrespective of the scan speed.

Completely compatible with Arthur and the new RISCOS operating systems. It can, for example, run on the RISCOS desktop, where it can create files for direct use in the RISCOS paint or draw programs. These programs would allow the pictures to be edited or altered in an infinite number of ways.

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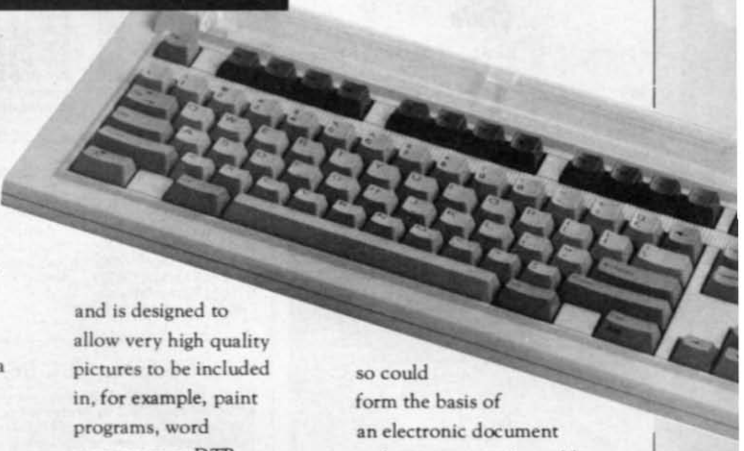
## The Software

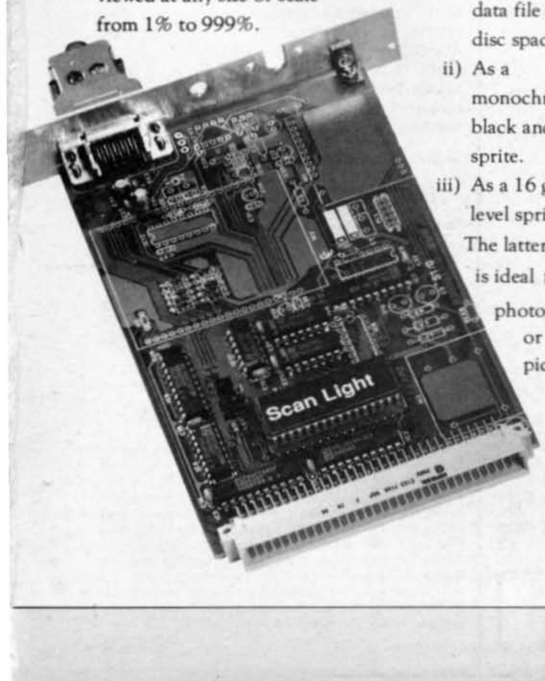


All the necessary scanner controlling software is included on a ROM as part of the scanner interface — it does not require a disc.

The software is WIMP based which makes it very easy to use, with all features being controlled by menu options. These features include:

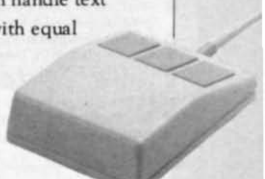
- The currently scanned page is viewed within a window, which can be scrolled and re-sized like all windows.
- It is possible to 'zoom in' or 'zoom out' so the scanned image may be viewed at any size or scale from 1% to 999%.
- Pixel editing facilities allow individual 200 dpi pixels to be drawn or 'undrawn'.
- Printer drivers are included to print the image to a variety of dot-matrix, inkjet and laser printers.
- The scan can be either a monochrome scan (best for text) or a 'half-tone' scan (best for pictures).
- The image may be viewed either as a monochrome, or 16 grey level picture.
- The whole image, or any selected part, may be saved in a variety of ways:
  i) As a compressed data file (saves disc space).
  ii) As a monochrome black and white sprite.
  iii) As a 16 grey-level sprite.

The latter option is ideal for photographs or pictures and is designed to allow very high quality pictures to be included in, for example, paint programs, word processors or DTP programs.



Scan-Light is equally suited to capturing photographs from magazines, diagrams or printed text from books, or hand written notes or signatures. An entire A4 page can be scanned into the computer and then filed away on disc to be recalled later (so it can be viewed, subsequently edited or re-printed) and so could form the basis of an electronic document archiving system. It could also be used to build libraries of pictures or diagrams for future reference.

Scan-Light, in conjunction with the outstanding graphics facilities available on the Archimedes, finally takes computers away from their text only backgrounds, into a world where they can handle text and pictures with equal ease.



Hardware and Software runs on Arthur and RISCOS operating systems, requires 1 MByte machine.

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Credit Card Orders (ACCESS & VISA) Tel (0923) 33383 or 50234 (24 Hours)

Acorn
The choice of Experience

The choice before and after the experience

## Archimedes micro

### Sale

| System | Basic | Mono | Colour |
|---|---|---|---|
| 305 | £695 | £755 | £910 |
| 310 | £830 | £889 | £1039 |
| 310M | £879 | £939 | £1099 |
| 440 | £2429 | £2485 | £2639 |

(Securicor carr. £10 on Archimedes)

### FREE PRINTER OFFER

With every Archimedes Micro purchased from us this month, we are giving away absolutely **FREE a Panasonic** KX-P1081 Dot Matrix **PRINTER** and an Archimedes **PRINTER LEAD** worth **£160**. If you already own a printer, then simply phone in for alternatives.
. . . and with every Archimedes 440, we are also giving away absolutely FREE the Printer AND Acorn's DEVELOPERS' TOOLBOX together worth £360.

### ACCESSORIES

| | |
|---|---|
| ● NEW Multitasking RISC OS | £29 |
| ● 0.5 Mb RAM for 305 | £139 |
| ● ROM Podule Acorn | £56 |
| ● ROM Podule (Computer Concepts) | £45 |
| ● ROM Podule (C C) with Battery Backup | £59 |
| ● 2 Podule Backplane + Fan (Acorn) | £37 |
| ● 2 Podule Backplane (Watford) | £25 |
| ● 4 Podule Backplane (Watford) | £38 |
| ● Backplane FAN only (for Hard Disc) | £9 |
| ● 2nd 800K Floppy Drive (305/310) | £118 |
| ● I/O Podule (with Analogue port, User port, & 1MHz bus) | £80 |
| ● MIDI add-on to I/O Podule | £37 |
| ● MIDI Expansion Card | £65 |
| ● Sound Sampler (Armadillo) | £104 |
| ● Chromalock Podule | £280 |
| ● 20 Mb Hard Disc & Controller Card | £469 |
| ● Watford's latest 20 Megabyte Hard Disc, Controller Card & Utilities Software | £379 |
| ● Econet Network Board | £49 |
| ● Archimedes IEEE Interface Adaptor | £269 |
| ● Dual RS232 Podule | £195 |
| ● 16 bit parallel I/O Card | £195 |
| ● PC Emulation Pack incl. MSDOS 3.21 | £65 |
| ● Archimedes Reference Manual | £29 |
| ● Arm Assembly Lang. Prog. Manual | £12 |

### WORDPROCESSORS

| | | | |
|---|---|---|---|
| Wordwise + | £18 | Pipedream | £89 |
| Image Writer | £25 | P. Spellchecker | £40 |
| Interword ROM | £35 | View | £49 |
| 1st Word Plus | £75 | Viewspell | £32 |
| Archie Spell Master | £39 | ViewIndex | £12 |

### DATABASES

| | | | |
|---|---|---|---|
| AlphaBase | £39 | Flying Start II | £80 |
| Viewstore | £49 | System's Delta + | £60 |

### SPREADSHEETS

| | | | |
|---|---|---|---|
| Intersheet ROM | £35 | Viewsheet | £49 |
| Sigmasheet | | | £59 |

### BUSINESS GRAPHICS

| | | | |
|---|---|---|---|
| GammaPlot | £59 | Interchart ROM | £25 |

### INTEGRATED PACKAGES

**Logistix** – Database, Spreadsheet, Time Management & Business Graphics £94

### GRAPHICS, ART & DESIGN

| | | | |
|---|---|---|---|
| Artisan | £31 | Gamma Plus | £60 |
| Pro Artisan | £140 | Graphic Writer | £23 |
| Support Disc | £16 | Autosketch | £69 |
| Toolkit (Beebug) | £32 | Toolkit (Clares) | £31 |
| Arc Termulator | £56 | Zarch | £16 |
| Alerian | £12 | Conquerer | £20 |
| Minotaur | £11 | Missile Control | £13 |
| Kermit | £46 | Enthar Seven | £29 |
| Archeffect | £20 | Arc PCB Designer | £82 |
| ArcTFS | £25 | Lingenuity Presenter | £24 |

### MINERVA's Archimedes Software

| | | | |
|---|---|---|---|
| Sigmasheet | £57 | Gammaplot | £57 |
| Deltabase | £24 | System Delta + | £69 |
| System Delta + Reference Manual | | | £25 |
| Order Processing* | £53 | Sales Ledger* | £53 |
| Stock Manager* | £53 | Purchase Ledger* | £53 |
| Nominal Ledger* | £53 | Reporter | £20 |
| School Administrator | | | £66 |

*** Requires System Delta**

### Archimedes to BBC SERIAL LINK

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers. Using this package it is possible to transfer any data from the BBC to Archimedes at upto 19200 baud.

**Only £15**

### Archimedes 5¼"/3½" Disc drive Interface

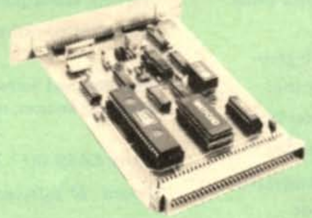
With this interface it is possible to connect almost any 5¼"/3½" disc drive with its own power supply to the Archimedes. NO SOLDERING is involved. Supplied complete with necessary lead.

**Only £21**

Note: This is not simply a lead. Attempting to connect an external disc drive by direct connection may result in damage to your Micro.

New

### Watford's 20Meg Archimedes Hard Disc



Watford Electronics' 20Meg hard disc fits internally into the Winchester slot provided. It is fully compatible with Acorn's hard disc upgrade, (the only difference is our low price). Price includes the Hard Disc Drive, Controller Podule & fitting instructions.

P.S. This upgrade requires a backplane and a fan.

| | |
|---|---|
| Type Arch-HD20 | £379 |
| Backplane for 2 Podules | £25 |
| Backplane for 4 Podules | £38 |
| Slimline Quiet Extractor Fan | £9 |

CREDIT TERMS now available. Please telephone or write in for further information.

### LANGUAGES (Archimedes)

| | |
|---|---|
| ANSI 'C'; ISO-PASCAL; FORTRAN 77; | £94 each |
| Cambridge LISP; PROLOG X | £181 each |
| LOGOTRON LOGO | £55 |
| BASIC Compiler | £89 |
| Archimedes Assembler | £189 |
| TWIN EDITOR | £27 |

## BBC MASTER

**MASTER** 128K Micro incl. Acorn's: View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus £35 worth of FREE OFFER (see below) **£345**

### FREE . . . £35 worth of Software

*Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control. With every BBC Master purchased from us this month.*

**BBC MASTER with Turbo Board + above SPECIAL OFFER** **£474**

Securicor Carriage on Micros £7

### ADD-ONs & ACCESSORIES

| | |
|---|---|
| Turbo 65C102 Add-on Module | £118 |
| Econet Module for the Master | £49 |
| Twin ROM Cartridge for Master | £8 |
| Quad ROM Cartridge for Master | £12 |
| Universal Processor Adaptor | £75 |
| Master Reference Manual I | (No VAT) £14 |
| Master Reference Manual II | (No VAT) £14 |
| Master Advance Ref. Manual | (No VAT) £18 |
| 64K Upgrade Kit for B+ | £32 |
| Acorn 1770 DFS Kit complete | £49 |
| ECONET Upgrade Kit for BBC | £42 |
| ALL ECONET UPGRADES Available | |
| ARIES' Professional IEEE Interface | £238 |
| Morley Teletext Adaptor with ATS Rom | £99 |
| Filestore E01S **£899** Filestore E40s | £799 |
| Filestore E60S **£1080** Ecolink | £270 |

### BBC MASTER COMPACT

| | | |
|---|---|---|
| System 1 | Standard Package | £305 |
| System 1A | System 1 + TV Modulator | £329 |
| System 2 | System 1 + Green Hires Monitor | £359 |
| System 3 | System 1 + Medium Res Colour Monitor | £469 |
| RS232 Kit for BBC Compact | | £25 |
| Additional 3½" Drive for BBC Compact | | £90 |

(Securicor carriage £10)

### 65C102 2nd PROCESSOR

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B. This is a complete package, with its own power supply, ready to interface with your BBC Micro.

**£159**

# CO-PRO Adaptor

CO-PRO ADAPTOR

With this Watford's Co-pro Adaptor unit, you can now attach any BBC Master's coprocessors to your original BBC B.
Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.
With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.
To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.
Master owners may use Co-Pro Adaptor to add a second Co-processor externally.
Watford, brings power to your BBC at only:

**£35** (carr £5)

# REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

**£15** (40 or 80 track)

**Acorn's Speech Synthesiser package, complete**
**Special Offer £15**
**BBC B Micro only**

## Versatile **BEEB SPEECH SYNTHESISER** Unit

Beeb Speech Synthesiser

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

**SPECIAL PRICE £32** (carr £2)

## VOLTMACE JOYSTICKS

| | |
|---|---|
| Delta 3B Single Joystick | £10 |
| Delta 3B Twin Joysticks | £15 |
| Delta 3C Joystick for Compact | £10 |
| Delta 14B Single Joystick | £11 |
| Delta 14B/1 Adaptor Module | £12 |
| Transfer Software Disc-Tape | £7 |

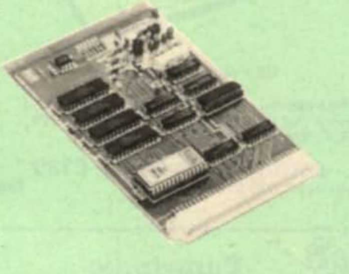
## ATTACHE CARRYING CASE

For the BBC Micro. Attractively finished in antique brown leatherette. Lockable.
Only **£10** (£2 carr.)

**By Popular demand we are now supplying refurbished and fully guaranteed BBC Micro Model B with Disc Filing System**

(Please telephone for price & availability)

# Archimedes Real-Time Digitiser



Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air television signals may also be digitised via a video recorder or TV tuner.

Once captured, Video images can be stretched, squahsed, rotated, stored on disk, printed, or used by applications software.

Applications include desktop publishing, graphics, animation, image analysis and recognition, medical imaging, automatic inspection and measurement, databases, interactive video, remote transmission of pictures via a modem, movement detection ... or anything else you can think of!

**SOFTWARE**
All driver software for the digitiser is contained in a ROM on the podule. Software facilities are accessed via operating system star (*) commands and SWI calls. A Utility Disk is included containing sample pictures, examples and Utility programs.

**RESOLUTION**
Images are digitised to 512 (h) x 256 (v) pixels, and then scaled to fit the Archimedes' screen. It is possible to digitise to 512 x 512 pixels if the picture is stationary for about 0.1 second. 512 x 512 images can either be displayed on a MultiSync monitor, or on a normal monitor using interlacing.

Pictures are digitised to 64 levels of grey (6 bits). Note, however, that it is only possible to display all 64 levels on a monochrome monitor, or a colour monitor which has a composite (CVBS) input. For this reason, the Philips CM8533 monitor is recommended instead of the standard Archimedes monitor. It is also possible to connect both a colour and a monochrome monitor at the same time.

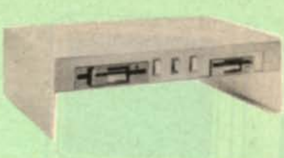
Any 2,16 or 256 colour graphics mode can be used to display digitised pictures. In two colour modes, grey levels are represented using dot patterns, which may be redefined if required (a pattern editor is supplied).

**SPEED**
Video fields are captured in real time (1/50th sec.), and then transferred to Archimedes' memory or the screen. The grab/display rate is dependant on the screen mode and picture size, up to 25 fields per second for quarter screen images, or 12.5 per second for fullscreen (Mode 9).

**HARDWARE**
The digitiser is a single width podule, with a BNC socket on the rear panel for the video input, which may optionally be terminated via a link. There is 128K of on-board memory to store the digitised image, and a 32K ROM on the podule contains all the driver software.

**Price £249**

## Disc Drives DP35-800S



A Double disc drive – with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master Series is the 5.25 inch disk, the standard for the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. For ease of access, the switches are front mounted. DP35-800S has its own power supply, independent of the BBC Micro.

Watford's new plinth enables users to read, write and format disks both in DFS and ADFS format – currently the accepted standard for the Master Compact and the Archimedes, it also enables the user to read disks written for the Archimedes. Ideal for both BBC & Master.

Launch Offer: **£165** (carr. £7)

# Z88 Sinclair's Portable Micro

The worlds first, truly portable Micro. It is A4 size, only an inch thick and weighs under 2lbs. Ideal for use when travelling or as a personal organiser.

Only: **£199**

**FREE**

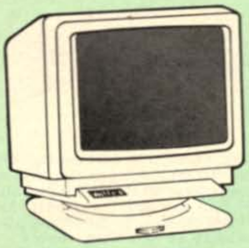
With every Z88 purchased from us this month, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

## ACCESSORIES

| | |
|---|---|
| Mains Adaptor | £8.65 |
| 32K RAM Pack or 32K EPROM Pack | £17.35 |
| 128K RAM Pack or 128K EPROM Pack | £43.40 |
| 512K RAM Pack | £169 |
| Z88 Spellmaster for Pipedream | £51 |
| Z88 to BBC Link | £21.70 |
| Z88 to PC Link II | £30 |
| Z88 to Macintosh Link | £49 |
| Z88 EPROM ERASER | £34.75 |
| Serial Printer Cable | £8.65 |
| Parallel Printer Cable | £24.00 |
| Z88 Modem | £145 |
| Z88 Soft Carrying Case | £8.50 |
| Sinclair Z88 Computing Book | £9.95 |
| AA Nicad Rechargeable Battery | £1.50 |
| Battery Charger, Compact & Fast (3 Hours) | £6 |

Continued →

# MONITORS



**All Monitors are supplied complete with BBC connecting leads FREE.**

## MICROVITEC 14"

| | |
|---|---|
| ● 1431 – Standard resolution as used on the BBC television computer programme | £175 |
| ● 1451 – Medium resolution, suitable for word processing in mode 0 | £219 |
| ● 1441 – High res, exceeds the capabilities of the BBC micro | £359 |
| ● 1431AP RGB + PAL and AUDIO | £199 |
| ● 1451AP RGB + PAL and AUDIO | £255 |
| ● **2030 CS 20" Med Res** | £380 |
| ● **2040 CS 20" Hi Res** | £675 |
| ● Dust Cover for Microvitecs | £5.50 |
| ● **Touchtec 501 Touch Screen** | **£239** |

## 14" MULTISCAN COLOUR

| | |
|---|---|
| ● **TAXAN** Multisync 770 Plus | £449 |
| ● **EIZO** 8060H – For technical info. read the review in Micro User, Jan. '89 | £439 |
| ● **EIZO** 9060S | £458 |

## TAXAN 12"

| | |
|---|---|
| ● Super Vision 2 **Type 620** Hi-res RGB Colour, Green/Colour Switch | £265 |
| ● Super Vision 3 – **Type 625** Super Hi-res RGB Colour, Green/Colour Switch | £315 |

Taxan High Resolution MONOCHROME Monitors with long persistence tube to reduce flicker.

| | |
|---|---|
| ● KX117 Green | £69 |
| ● KX119 Amber | £72 |

## PHILLIPS

| | |
|---|---|
| ● BM7502 12" Hi-res Green Monitor | £65 |
| ● CM8833 14" Med. Res Colour Monitor | £219 |

## STAR BUY

- **PHILLIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

**ONLY £199**

| | |
|---|---|
| Dust Cover for Phillips Monitors | £6 |

### SPARE LEADS

| | |
|---|---|
| **BNC Lead for Zenith or Philips** | £3 |
| Skart Monitor Lead | £5 |
| RGB lead for TAXAN Monitors | £3 |
| Archimedes Colour Monitor Lead | £7.50 |

## SWIVEL BASES

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the monitor viewing angle.

for 12" Monitors **£8** (carr. £2.50)
for 14" Monitors **£12** (carr. £2.50)

## Anti-Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for all wordprocessor users.

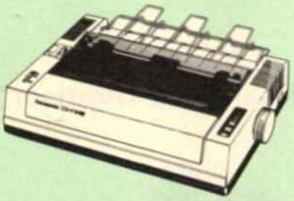
**£12**

## TAXAN KP-815 PRINTER

### Offer Price £155

| | |
|---|---|
| **Taxan KP915** 132 Column | £275 |
| RS232 Interface | £49 |
| RS232 Interface with 2K Buffer | £69 |
| RS232 Interface with 16K Buffer | £89 |

## Panasonic KX-P1081



**UK's most popular printer.**

***(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).***

*SPRING SALE OFFER only:* **£139**

| | |
|---|---|
| Optional RS232 Interface: | £39 |

NEW

## Panasonic KX-P1124

Watford Electronics, your authorised Panasonic Premier Dealer, brings you from the prodigious Panasonic Stables, this fabulous 24-pin printer.

Available NOW at a superbly realistic price, KX-P1124 perfectly balances features, quality of construction and Value for Money to produce the printer of tomorrow, here today, ready to sweep the current generation of machines away.

Ingenious innovation in terms of software control codes permits great flexibility when it comes to defining the print style. A nippy 192 cps of clear draft speed backs up the crisp 60 cps Letter Quality text mode, with 6 fonts. A delightful range of assorted character width is efficiently supported, with sizes ranging from a broad 5 to petite 20 CPI, even in LQ mode. Some of the extensive support for serious use includes, justification, centering, left and right ranging and proportional spacing.

A full 96 ASCII character set is supported with an extended set of Italic, 32 International (13 countries) and 158 IBM special characters. A 6K Print Buffer alleviates much of the wait time normally associated with printing, whilst the bi-directional logic seeking (character & graphics), print head takes the quickest route to print as required.

Simple paper parking and easy front loading of A4 sheets add an extra dimension. Not only Epson LQ & IBM Proprinter emulation modes are implemented, but extra codes have been added to cater for LQ option.

At less than 53dB, this is perhaps the quietest dot matrix printer on the market.

Watford's Launch Offer: **£269**

## Panasonic Printers

| | |
|---|---|
| ● **KX-P1180** 9pin 80col. 192/38 CPS | £169 |
| ● **KX-P1540** 24pin 80col. 240/80 CPS | £435 |
| ● **KX-P1592** 9pin 136col. 216/45 CPS | £275 |
| ● **KX-P1595** 9pin 136col. 288/61 CPS | £409 |
| ● **Panasonic KX-P4450** LASER PRINTER Latest technology at Watford's special offer price | £1,499 |

| | | | |
|---|---|---|---|
| ● Spare Toner | £29 | ● A4 Feeder | £55 |

## INTEGREX COLOUR JET

| | |
|---|---|
| ● Colour Jet 132 Printer | £515 |
| ● Paper Roll | £6.50 |
| ● Screen Dump Software | £10 |
| ● Colour Cartridge | £14 |
| ● Black Cartridge | £8 |
| ● 100 A4 OHP transparencies | £55 |
| ● 8K Serial Interface Optional | £123 |
| NEW – Intergrex COLOURCEL NPQ Ink Jet Colour Printer | £2,695 |

## NEC P2200 PINWRITER

24 pin; 80 column; 168CPS – 56CPS LQ; Epson LQ compatible, 7K Buffer; 7 resident FONTS, Friction & Tractor feed, front load single sheet feed, etc.

**£269**

| | |
|---|---|
| Pinwriter Serial Interface (optional) | £55 |
| P2200 Cut Sheet Feeder | £65 |
| Additional Font Cartridge | £25 |
| NEC P2200 Pinwriter Ribbon | £6 |

## NEC PINWRITER P6/P7 Plus

| | | | |
|---|---|---|---|
| **NEC P6**+ 80 columns | £439 | **NEC P7**+ 136 columns | £575 |
| Colour Option | £74 | Serial Interface | £73 |
| Cut Sheet Feeder | £125 | | |

## Star Printers

| | | | |
|---|---|---|---|
| **Star LC10** | £169 | **LC10 Colour** | £215 |
| **Star LC24-10** | £279 | **NB24-10** | £399 |
| **LC10 Colour Ribbon** | £6 | **Cut Sheet Feeder** | £65 |

| | |
|---|---|
| **Brother HR20 DaisyWheel Printer** | £339 |

## EPSON PRINTERS

| | | | |
|---|---|---|---|
| EX800 | £405 | LQ850 | £430 |
| EX1000 | £564 | LQ1050 | £570 |
| FX850 | £315 | LQ2550 | £925 |
| FX1000 | £425 | LQ2500+ | £839 |
| FX1050 | £439 | LX800 | £165 |
| LQ500 | £275 | SQ2500 | £975 |
| GQ3500 Laser | £1150 | | |

### PLOTTERS

| | |
|---|---|
| Hitachi 672 Colour Plotter | £475 |
| Plotmate Plotter A4S | £379 |
| Plotmate Plotter A3M | £549 |

### CUT SHEET FEEDERS for

EX800 **£149**; EX1000/LQ2550 **£210**; FX800 **£149**; FX1000 **£179**; LQ/LX800 **£139**; LQ500 **£75**; LQ850 **£135**; LQ1050 **£175**.

### TRACTOR FEED for

EX800/1000 **£85**; LQ800 **£44**; LQ850 **£69**; LQ1050 **£85**; LQ2500 **£195**

### ACCESSORIES

| | |
|---|---|
| ● EX800/1000 Colour Option | £55 |
| ● EX800/1000 Colour Ribbon | £18 |
| ● LQ2500 Colour Option | £65 |

**(Securicor Carriage on Printers £7**

## EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

| | | | |
|---|---|---|---|
| RS232 | £32 | RS232 + 2K Buffer | £52 |
| IEEE 488 | £40 | RS232 + 8K Buffer | £79 |

## PRINTER LEADS

| | |
|---|---|
| BBC Centronics 4' long | £5 |
| BBC Centronics 6' extra long | £7 |
| Compact's Special Centronics Lead | £7 |
| Archimedes Printer Lead 1 meter | £6 |
| Nimbus Centronics Lead | £12 |
| IBM Parallel Lead 1 meter | £6 |
| Double Ended 36 way Centronic Lead 4' | £7 |
| Double Ended 36 way Centronics Lead 6' | £9 |
| MSX Centronics Parallel Lead 4' | £12 |
| RS232 Leads (Various) | P.O.A. |

## RS-232 GENDER CHANGERS

| | |
|---|---|
| Male to Female | £4.95 |
| Male to Male | £4.95 |
| Female to Female | £4.95 |
| 25 way Male to 9 way Female | £4.90 |

## Listing Paper (Perforated)

| | |
|---|---|
| ● 1,000 Sheets 9½" × 11" Fanfold Paper | £7 |
| ● 2,000 Sheets 9½" × 11" Fanfold Paper | £12 |
| ● 1000 Sheets 9½" x 11" NCR 2 Part Fanfold | £19 |
| ● 1,000 Sheets 15" × 11" Fanfold Paper | £9 |
| ● 1000 Sheets true A4 Fanfold Paper 70gms | £11 |
| ● 2000 Sheets true A4 Fanfold Paper 70gms | £19 |
| ● Teleprinter Roll (Econo paper) | £4 |

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50. 2K Sheets £3.00

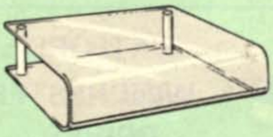
## PRINTER LABELS

### (On continuous fanfold backing sheet)

| | |
|---|---|
| 1,000 90 × 36mm (Single Row) | £5.00 |
| 1,000 90 × 36mm (Twin Row) | £4.90 |
| 1,000 90 × 49mm (Twin Row) | £7.50 |
| 1,000 102 × 36mm (Twin Row) | £6.25 |

Carriage on 1,000 Labels £1.00

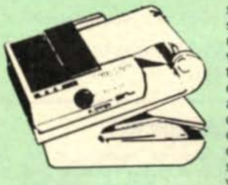
## Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand. The printer sits on top and the fanfold paper rests neatly underneath, thus occupying the same space as the printer footprint.

**Only: £16** (carr. £3)

## Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

***80 Column version £23** (carr. £3)*

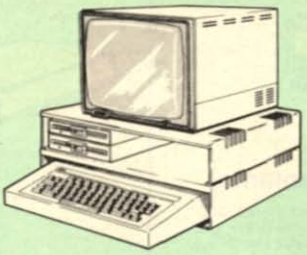
***132 Column version £26** (carr. £3)*

## PRINTER RIBBONS & VARIOUS DUST COVERS

| Type | Ribbons | Dust Covers |
|---|---|---|
| **Brother HR15/20** | £3.00 | – |
| **BBC Micro** | – | £3.50 |
| **BBC Master** | – | £4.00 |
| **Archimedes Micro pair** | – | £9.00 |
| **IBM PCs pair** | – | £6.00 |
| **RX/FX80/MX80** | £3.00 | |
| **DMP2000** | £3.75 | £4.75 |
| **EX/LQ800** | £4.50 | £4.50 |
| **EX/LQ1000** | £7.50 | £5.00 |
| **RX/FX80/85/800/MX80** | £3.90 | – |
| **RX/FX100/1000** | £5.75 | – |
| **Kaga/Taxan KP810/815** | £4.90 | £4.00 |
| **LC10 (Black)** | £4.25 | £5.00 |
| **LQ500/800** | £3.75 | £5.00 |
| **LQ1050/LQ2500** | £8.50 | £5.50 |
| **LX80/86/800** | £3.80 | £4.50 |
| **M1009/GLP** | £3.80 | £3.75 |
| **Panasonic KX1080/81** | £4.00 | £4.75 |
| **SQ2500** | £23.00 | £5.50 |
| **Star NL10** | £3.75 | £4.50 |
| **Olivetti Ink Jet Cartridges (set of 4)** | £9 | |

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

## PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

| | |
|---|---|
| Single BBC Plinth 420 x 310 x 105mm | £12 |
| Double BBC Plinth 420 x 310 x 210mm | £20 |
| Printer Plinth 420 x 310 x 105mm | £12 |
| Single Master Plinth 490 x 310 x 105mm | £13 |
| Double Master Plinth 490 x 310 x 210mm | £24 |

(Carr. Single plinth 12; double plinth £3)

## Universal Printer Sharers/Changers

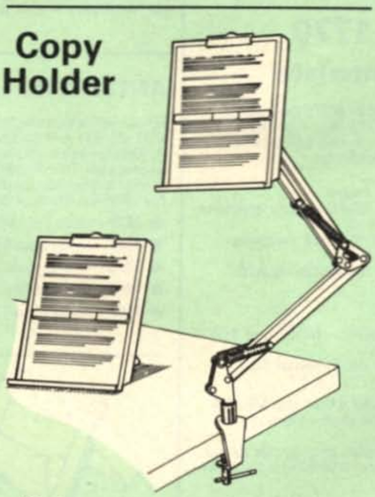
Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spagetti Junction of wires). Internal connection is made via high quality ribbon cables.

**(Ideal for School environments.)**

| Connects | Serial | Centronics |
|---|---|---|
| 2 to 1 | £20 | £22 |
| 3 to 1 | £27 | £30 |
| 5 to 1 | £36 | £39 |

(Cables extra at £6 each. Please specify type required when ordering)

## Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)

Angle poise **£12** (carr. £3)

## MEGABUFFER 256

The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm**.

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- ● Improves efficiency by making more efficient use of computer and printer.
- ● Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- ● Total compatibility with all software.
- ● Cheaper phone bills when using your Modems.
- ● Ideal for those doing large graphics screen dumps that are slow to print.
- ● Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- ● Data Dump facility is included.
- ● Built in test unit for both the buffer & your printer.

**Only £149** (carr £5)

NEW

## Handy 2 Way Printer Switch

A handy two way compact printer switch that enables you to connect 2 Micros to 1 printer, or 2 printers to 1 Micro. Attaches easily to your printer, monitor, etc. A low cost solution for educational establishments. Ideal for those wishing to use a dot matrix and a laser printer. Available in two configurations.

| | |
|---|---|
| Compact AB Switch Centronics | **£20** |
| Compact AB Switch RS232 | **£19** |

(Cables extra at £6 each)

## THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

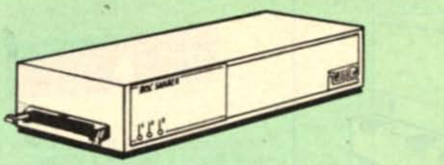
**£5.95** (No VAT)

VISA

**CREDIT CARD 24 HOUR**
**Ansaphone Hot Lines**
**(0923) 50234 or 33383**

Continued →

# DISC DRIVE SHARER



## (Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£65** Price includes 3 Cables

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## NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

## WATFORD's & ACORN's DFSs

*Watford's popular and widely acclaimed DFS has now been available for six years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade.* ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn standard DFS). (while Acorn's 1770 DFS is fully compatible with Watford's Mk II DDFS)***

| | |
|---|---|
| ● *Watford's sophisticated DFS ROM only* | **£16** |
| ● *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* | **£12** |
| ● *DFS Manual (Comprehensive)* | *(no VAT)* **£6.95** |
| ● *DNFS ROM only* **£17** | ● *ADFS ROM only* **£25** |

*(P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).*

(The Single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

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NEW

# Watford's MkII 1770

## Double Density DFS Interface

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features:

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00**.

| | |
|---|---|
| ● Special introductory offer | **£39.00** |
| ● DDFS Manual | (No VAT) **£6.95** |
| ● We will exchange your existing DFS Kit for our sophisticated DDFS for only | **£25.00** |

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

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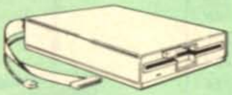
## DUST COVERS (For our Disc Drives)

| | |
|---|---|
| Single CLS (without PSU) **£3.20** | Twin CLD (without PSU) **£3.85** |
| Single CS (with PSU) **£3.95** | Twin CD (with PSU) **£3.90** |

## Special 40/80 Disc Drive/DDFS Mk II Offer



- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both, Single & Double Density modes.
- A comprehensive User Friendly Manual.

A Bargain at Only **£123** (£7 carr)
(Offer valid while stocks last)

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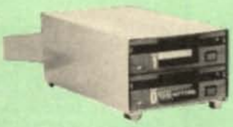

## 3½" DISC DRIVE OFFER

These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

| | |
|---|---|
| ● **CLS35 400K Unit** | **£69** |
| ● **CLD35 800K Unit** | **£126** |

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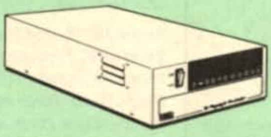

# WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a Utilities Disc.

Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBc B (with 17 X disc interface).

● 10 Megabyte **£350;** ● 30 Megabyte **£405**
(Securicor Carriage £9)

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## FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

**£4**

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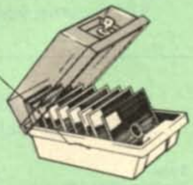
## ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



| | |
|---|---|
| ● **M35** - holds upto 50 5¼" discs | **£4.95** |
| ● **M85** – holds upto 95 5¼" discs | **£6.95** |
| ● **M25*** – holds upto 25 3 ½" Discs | **£4.95** |
| ● **M50** – holds 50 3½" Discs | **£6.50** |
| ● **M10** – holds upto 10 Data Cartridges | **£15** |

* Not lockable

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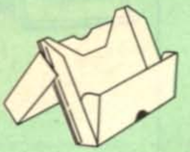

## PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

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## DISC PLONKER RACK

When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. It holds up to eight 5¼" Discs.

Protection at Only: **£2**

## Quality Disc Drives from Watford

*To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.*

*The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".*

*The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.*

***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

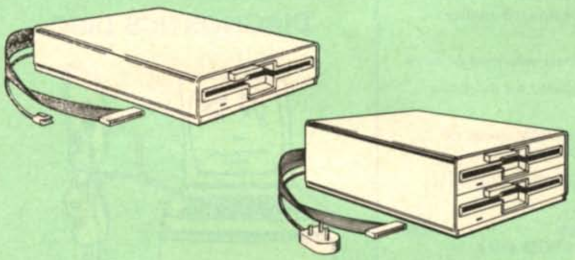
*Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.*

*If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.*

*Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £10. (At Watford we anticipate your needs of tomorrow, not just today)!*

*When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 4th page of our advert for the Plinths).*
*P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.*

**Our Disc Drives conform to BS415**



**"Test Bureau Approved for Use in Education"**

| Capacity | Drives without P.S.U. | | Drives with P.S.U. | |
|---|---|---|---|---|
| | Single | Twin | Single | Twin |
| 400K (720K) | CLS400S<br>£79 | CLD 400<br>£168 | CS 400S<br>£89 | CD400<br>£188 |
| 800K (1.44M) | | CLD 800S<br>£159 | | CD 800S<br>£169 |

- TWIN Disc Drive Case, complete with Power Supply & Cables **£43**

**Securicor carriage on Disc Drives £5 to £6**

*Prefix **C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

*Suffix **S** = 40-80 Switchable*

*e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.*

**Cable to connect 5¼" Disc Drives to BBC Compact**
**Single £9 Twin £12**
**Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13**

## Mysteries of Disc Drives & DFS Revealed

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

**£5.95** (Book No VAT)

## 3M – DISKETTES

*3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.*

| | |
|---|---|
| ● *10 × 5.25" S/S D/D 40 Track Diskettes (744)* | ***£6.00*** |
| ● *10 × 5.25" D/S D/D 40 Track Diskettes (745)* | ***£7.00*** |
| ● *10 × 5.25" S/S D/D 80 Track Diskettes (746)* | ***£11.50*** |
| ● *10 × 5.25" D/S D/D 80 Track Diskettes (747)* | ***£11.00*** |
| ● *10 × 5.25" 1.6M D/S D/D High Density Discs for IBM XT and AT* | ***£16*** |
| ● *10 × 3.5" S/S D/D 40/80 track Discs* | ***£10.00*** |
| ● *10 × 3.5" D/S D/D 40/80 track Discs* | ***£11.75*** |
| ● *10 × 3.5" High Density Diskettes* | ***£25*** |

**Special Offer**
Free Designer watch with 5 packs of 3M discs purchased from Watford Electronics.

## TOP QUALITY 3.5" & 5.25" DISKETTES

To complement our range of Quality Discs and Disc Drives, WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

| | |
|---|---|
| ● *10 × **M3** 3.5" D/S D/D 80 Track Discs* | ***£10*** |
| ● *10 × **M9** 3.5" Double Side High Density* | ***£25*** |
| ● *10 × **M4** 5.25" S/S D/D 40 Track Discs* | ***£5*** |
| ● *10 × **M5** 5.25" D/S D/D 40 Track Discs* | ***£7*** |
| ● *10 × **M7** 5.25" D/S D/D 80 Track Discs* | ***£9*** |
| ● *10 × **M8** 5.25" D/S H/D Hi-Density Discs* | ***£14*** |
| ● *3" Double Sided Discs* | ***£2.50** each* |

## Special BULK OFFER on 5¼" DISCS

PRICES SLASHED

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

### BULK PACK DISCS in lots of 100

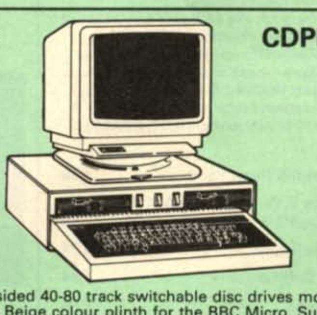
| Type | S-S 40T | D-S 40T | D-S 80T |
|---|---|---|---|
| ● Without Sleeves | £35 | £39 | £45 |
| ● With Sleeves | £38 | £42 | £48 |

## DISC ALBUMS

Attractively finished in black leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

**£4**

**DP35-800S** **CDPM800S**



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

**CDPM 800S for the BBC & Master £182**
**DP35-800 for BBC/Master £169**
(For DP35-800S spec. see Page 2 of our advert)
*(Securicor Carr. £7)*

(The above drive units are 2 Megabytes unformatted)

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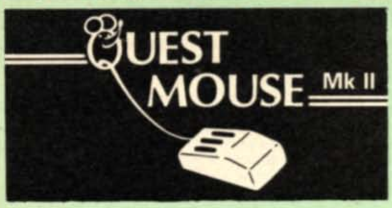


*The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and its RUBBER COATED STEEL BALL is smooth and easy to use on virtually any work surface. This also eliminates any directional bias that one encounters on the most well-known mouse for the BBC. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.*

*The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.*

## *QUEST PAINT*

*The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.*

*The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.*

### *SOFTWARE FEATURES*

*The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.*

*Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.*

| | |
|---|---|
| ● Quest Mouse II & Quest Paint | £58 |
| ● Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont | £89 |
| ● Quest Mouse II only | £26 |
| ● Quest Paint Software only | £34 |
| ● Quest Font Disc | £15 |
| ● Quest Mouse Mat (Red or Blue or Green please specify) | £3 |
| ● Part Exchange your unreliable AMX Mouse for a Quest Mouse for only | £22 |
| ● GXR ROM for the BBC Micro | £22 |

(P.S. Quest Paint is not compatible with BBC Compact)

**Continued**

N.B.
1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

## ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.
Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

**ConQuest ROM Package** **£30**
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

## *MARK II LIGHT PEN*

*Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.*

***Price Only £21***

## RB2 Marconi
## TRACKER BALL

| | |
|---|---|
| RB2 (AMX/Quest compatible) | £45 |
| RB2 including Quest Paint | £75 |

## FLEET STREET EDITOR

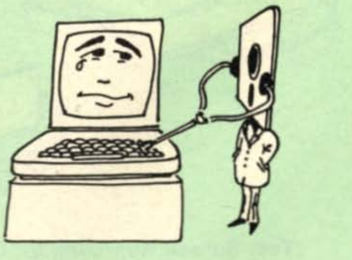
| | |
|---|---|
| Software pack for BBC Micro | £33 |
| Software pack for the Master | £39 |
| Software Pack for Compact | £40 |
| Admin Xtra Disc Utility | £13 |
| Walt Disney Disc Utility | £13 |
| Fonts N Graphics Disc Utility | £13 |

## *THE NEW Mk III AMX MOUSE*

**ONLY: £59** **Inc. Super Art package**
(carr £3)
*(Please specify for BBC, Master or Compact)*

| | |
|---|---|
| MOUSE MAT | £3 |
| AMX MOUSE ONLY | £29 |
| AMX UTILITY Package | £13 |
| AMX SUPERART Package | £34 |
| AMX STOP PRESS – A Desktop publising software. Works with Keyboard, Joystick or a mouse | £32 |
| **PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker** | £13 |
| AMX DESIGN (ROM) | £55 |
| AMX XAM Educational | £15 |
| AMX EXTRA EXTRA | £16 |
| AMX MAX A gem of desktop (ROM) | £15 |

## DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

**Only £20.00**

VISA

**CREDIT CARD 24 HOUR**
**Ansaphone Hot Lines**
**(0923) 50234 or 33383**

## *BEEB* VIDEO DIGITISER

**"Test Bureau Approved for Use in Education"**

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package i designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

**£109** (Carr. £5)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

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## *Magazine Maker*

(As seen on TV)

A combination of the Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Stop Press to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Stop Press's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Stop Press's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)

WAPPING EDITOR
"MIGHTIER THAN THE QUILL"

Watford Electronics bring professional quality Desktop Publishing to the Beeb. The Wapping Editor is a totally self contained mouse-driven desktop publishing package designed to run on the BBC B, B+ and Master computers. The massive 64K Rom contains ALL the software you need to do your own publishing. It 'Brings the Freedom of Press' to your fingertip. The software has a word processor, a graphics package, a page layout section and a font designer. Although very sophisticated, Wapping Editor is simplicity itself to use. Anyone already familiar with Quest Paint will immediately feel at home.

## GRAPHICS PACKAGE

Imagine Quest Paint re-written to take advantage of the high resolution of Mode 0, well this is it. The Wapping Editor could well be worth buying for this facility alone. This must surely be the graphics.

## WORD PROCESSOR

This section is a fully functional word processor specially tailored to suit the Desktop Publishing environment. Gone are all the unnecessary and cumbersome text formatting commands – these are dealt with in the 'Page-Layout' section. The features of this word processor include wordwrap, wordcount, insert/overwrite, move block, copy block, delete block, search and replace, browse, etc, many of these features being mouse controlled. Text input can of course be taken from existing word processor files like Wordwise, View, etc, but it is not necessary to have a separate word processor in order to use this package.

## PAGE-LAYOUT SECTION

Page Layout becomes easy using these mouse-driven routines. The user simply 'pulls' a rectangle onto the page and states which text document or graphic is required to fill the space – it's as simple as that! Text can be automatically printed in a pre-set number of columns, left justified and/or right justified, or centered. Several different typefaces can be held in memory at one time. Graphics may be stretched, squahsed or cropped to fit any size rectangle. Graphics input can be from the software provided in the package or, using the 'mode convert', from any graphics mode screen.

## THE FONT EDITOR

This is an enhanced version of the font editor contained in the Con-Quest ROM and allows the editing of ALL 95 characters. As well as being able to design your own typefaces, fonts from other DTP packages or from Quest Pain may be loaded into the editor and converted for use with the Wapping Editor. This sophisticated editor has numerous functions including slide, flip, invert and rotate individual characters or the whole font. Individual characters can be mirrored or copied and a mask feature allows you to superimpose two characters. Lines and columns can be inserted or deleted allowing the character to be stretched or squashed. This font editor will also allow 'font' and 'brush' files to be designed for use with Quest Paint.

This package is the latest in the line of integrated professional quality mouse-driven software from Watford Electronics, the company that adds power to Beeb.

| | |
|---|---|
| Wapping Editor | Launch Offer: **£69** |
| Wapping Editor with Quest Mouse | **£89** |

## DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump

For use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Mannesman Tally and compatibles.

**Only: £25**

---

## *OFFICE MASTER*

**CASHBOOK** – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

**FINAL ACCOUNTS** – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

**MAILIST** – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

**EASILEDGER** – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

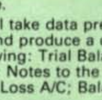
**INVOICES & STATEMENTS** – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

**STOCK CONTROL** – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

---

## *OFFICE MATE*



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

**DATABASE** – Set up a computerised card index system with powerful search facilities.

**SPREADSHEET** – Offers many calculation and editing features.

**BEEBPLOT** – Provides visual representation from Spreadsheet data.

**OFFICE MATE Only £10** (Disc)

Continued

# ARIES CORNER

## B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£80** (carr. £2)

## Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

| Price: | | |
|---|---|---|
| | Aries B-12 | £40 |
| | Aries B-12C | £5 |

**CREDIT CARD 24 HOUR**
**Ansaphone Hot Lines**
**(0923) 50234 or 33383**

## ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

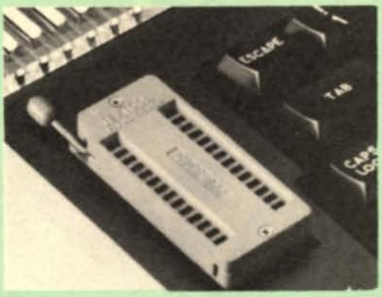
**£238** (Carr £3)

## EXTERNAL ROM BOARD for BBC MASTER

This external Beige finished, free standing cased unit with its own Power Supply allows you to plug-in upto 12 ROMs and 16K Sideways RAM.

Only £78

## SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

## Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

| | |
|---|---|
| ● Complete System | £11 |
| ● Spare Cartridges | £2.50 |
| ● Spare Rack | £1.50 |

**ROM Cartridges for the BBC Master**
Twin **£8;** Quad **£12**

## 16K DISC RAM

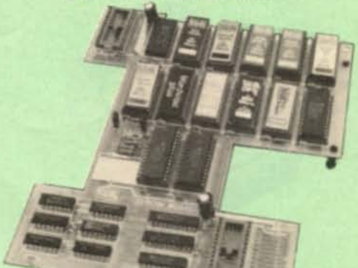
Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Compact construction.
- Supplied complete with Battery Backup.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£35** (carr £2)

P.S. 16K Disc Ram Board is not designed to work in conjunction with a Sideways ROM Board.

## SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

**Price: Only £35**
Battery backup fitted **£39**
Battery Backup only **£3**
(carriage £2)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: **£8**

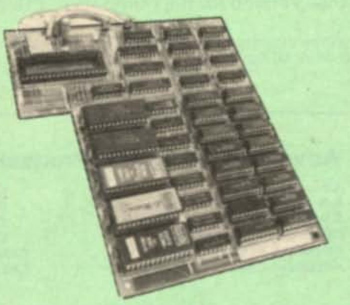
## USER PORT SPLITTER UNIT

User Port Splitter
A
B

Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£22** (carr £2)

## ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

***INTRODUCTORY PRICES:***

| | |
|---|---|
| ● ROM/RAM card with 32k dynamic RAM | *£48* |
| ● ROM/RAM card with 64k dynamic RAM | *£65* |
| ● ROM/RAM card with a massive 128k dynamic RAM | £109 |

(carriage on ROM-RAM Card £3)

***OPTIONAL EXTRAS:***

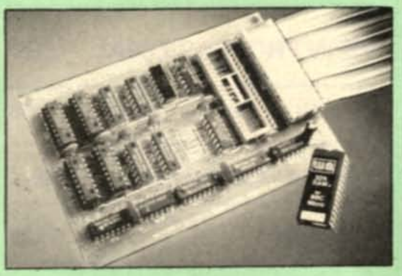
| | |
|---|---|
| ● 16k plug-in Static RAM kit | £17 |
| ● 16k Dynamic RAM for Upgrade | £17.50 |
| ● Battery backup | £3 |
| ● Read and Write protect switches | £2 each |
| Complete ROM-RAM board All options installed | £115 |

**P.S.**
**Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less**

## *32K*

## SHADOW RAM-Printer Buffer

### Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

**Only £59** (carr £2)
(Price includes a comprehensive manual and the ROM)

---

### INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

## THE COMPLETE BBC COMPUTER USER HANDBOOK

*"Why has no-one written a book like this before? It's long overdue".*
If you own a BBC-B, BBC B+, Electron, Master 128, Master Compact or Archimedes then this book is for you. It shows you how to get the most from your computer, and how to make the computer work for you. Although some sections are machine specific, most of the information, programs, hints and good solid experience are for the whole range of BBC machines. The general style and level means that both beginner and expert will feel satisfied with the quality and quantity of the material.

**GENERAL** – Uses and abuses of computers.

**HARDWARE** – How to design your own work station. Hardware additions (disc drives, ROMs, printers, 2nd processors, etc). DIY alterations.

**HARDWARE RUNNING BBC-BASIC** – All BBC machines are described with their differences. Compatibility between the various BBC machines. Networks. The Archimedes and its advantages.

**GETTING ORGANISED** – so that you keep track of your programs and control of your software. Setting up for easier programming sessions.

**NEAT PROGRAMMING** – Good style. Writing structured programs. Getting the best from BBC-BASIC, Graphics and screen displays. Speeding up programs. Saving space.

**GENERAL PROGRAMMING TIPS AND HINTS** – with a multitude of examples (eg input vetting, dealing with dates, blanking out function key messages, error trapping, disabling ESCAPE and BREAK, use of EOR with colour, etc).

**DEBUGGING** – Specific errors and how to handle them. How to test programs fully.

**STANDARD PROGRAMS** – Assessing word-processors, spread-sheets, databases, graphics packages, communications etc. How to customise them to your own requirements.

**COMPUTERS AT HOME AND IN THE OFFICE** – Introducing the computer to the office. Program protection. Computers and the law. Communications. Selling your own programs. 28 FULL CHAPTERS, elegantly written and extensively indexed. To dip into, consult, or read from cover to cover, again... and again... and again...

**£14.95** (Book No VAT)

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## *APOLLO*

### The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**
- **£6.50 off annual Membership to Micronet, Prestel and Telecom Gold.**

Sale Offer: **£64** **(Carr £5)**
Price includes, the Modem, Comm Software Cables & Operating Manual).
(Write in for full specification)

**Continued** →

## COMPUTER CONCEPT'S ROMS

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| ACCELERATOR | £30 |
| CARETAKER Basic Utility | £23 |
| DISC DOCTOR | £28 |
| Graphics ROM | £29 |
| TERMI | £25 |
| COMMUNICATOR | £49 |
| Printmaster | £24 |

## Wordwise £26

## Wordwise plus £40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

## Word-Aid

### The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only £24

(N.B. Word Aid requires a Disc Interface in your Micro)

| | |
|---|---|
| **HI-WORDWISE-PLUS DISC:** | £5 |
| **SPELL MASTER** | £42 |

## Inter SHEET ONLY £37

## INTER CHART ONLY: £25

## Inter-WORD £36

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All Prices Exclusive of VAT

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| | |
|---|---|
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| **VIEW 3.0 ROM** | £48 |
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| **VIEW-INDEX** | £12 |
| **OVERVIEW Packs 1 & 2** | £69 |

### Watford's own Sophisticated VIEW PRINTER DRIVERS

| | |
|---|---|
| Epson FX80 & Kaga KP (Disc) | £8 |
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## BBC SOFTWARE'S Popular Educational Software

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| Maths with a Story 1 (Disc). 4 primary level maths programs | £11.25 |
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| BONDING: Science (Disc) O Level Chemistry program. | £20.00 |
| ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program. | £20.00 |
| ELECTRONICS IN ACTION (Disc) O Level program | £19.95 |
| NEWTON & THE SPACE SHUTTLE (Disc) O Level program. | £20 |
| ECOLOGY (Disc) O Level program. | £20 |
| POLYMERS (Disc) O Level program. | £20 |
| Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. | £20 |
| FOOD & POPULATION (Disc) O Level program. | £20 |
| MICROTECHNOLOGY (Cassette) O Level program. | £11.25 |
| A VOUS LA FRANCE (2 Cassettes) A French language home study aid. | £21.70 |
| DEUTSCH DIREKT! (Disc & Audio Cassette) | £19.95 |
| Modem Master (Disc) | £11.25 |
| ADVANCED TELETEXT SYSTEM | £8.65 |
| PERIOD TABLE SOFTWARE | £20 |
| Astronomy – Primary (Disc) | £12 |
| Computers at Work – Primary | £17.35 |
| Introducing Geography – Primary | £17 |
| **Introducing Geography 11-17yrs** | £17.50 |
| Electric Fields 6-14 years | £11.25 |
| BlackQueen Contract Bridge | £13 |
| Espana Viva – 3 Discs | £19.95 |
| A Vous La France Disc | £21.50 |

## MINI OFFICE II

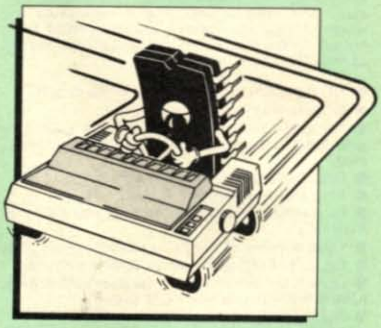
| | |
|---|---|
| DISC Version for BBC B & B+ | £14.00 |
| DISC Version for BBC Master | £16.50 |
| Disc Version for the Compact | £18.00 |

(When ordering please specify for which Micro & 40 or 80 track Disc).

## Advanced Computer Products

| | |
|---|---|
| Advanced Disc Toolkit | £30 |
| Advanced Disc Investigator | £25 |
| Advanced 1770 DFS BBC | £29 |
| Advanced 1770 DFS Master | £30 |
| Advanced File Manager | £25.00 |
| Advanced Control Panel | £30.00 |

## VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

**Price: Only £33**

## BOOKS (No VAT on Books)

| | |
|---|---|
| 15 Hr Wordprocessing BBC/View | £5.95 |
| 15 Hr Wordprocessing BBC/WW & WW+ | £5.95 |
| 30 Hour BASIC (BBC Micro) | £12.95 |
| 6502 Assembly Language Programming | £19.95 |
| 6502 Application | £13.95 |
| 6502 Development Package | £7.50 |
| 6502 Programming the | £16.95 |
| 6502 Reference Guide | £10.95 |
| 68000 Assembly Language | £15.95 |
| 68000 Assembly Language Prog. | £10.95 |
| 68000 Assembly Language Techniques | £24.95 |
| 68000 Machine Code Programming | £13.00 |
| 68000 Microprocessor Handbook | £14.95 |
| 68000 Programming the | £22.95 |
| 68000 User Guide | £8.95 |
| 6809, Programming the | £18.95 |
| Advanced Disc User Guide | £18.95 |
| Advanced Prog. Guide to BBC | £9.95 |
| Adv. Sideways RAM User Guide | £9.95 |
| **Advanced User Guide for BBC** | £10.95 |
| Amiga Hardware Ref Manual | £23.70 |
| Amiga Machine Lang. Guide | £19.95 |
| ARM Assembly Lang. Prog. Manual | £14.95 |
| Art of Microcomputer Graphics | £16.95 |
| Assembly Language Prog. for the BBC | £10.95 |
| AY-3-8910 Programmable Sound Generator Data Manual | £3 |
| BASIC 2-User Guide | £2 |
| BBC-Advanced Graphics with the | £11.75 |
| BBC - Advanced Programming Techniques for | £8.95 |
| BBC-Mastering Assembly Code | £8.95 |
| BBC Micro & the small Business | £5.75 |
| BBC Micro Basic Sound & Graphics | £7.95 |
| BBC Micro-File Handling On | £8.50 |
| BBC Micro Programs in BASIC | £5.95 |
| BBC Micro ROM Book | £10.95 |
| BBC Micro-within the | £13.95 |
| BBC Master 128 for High Flyer | £10.95 |
| BCPL User Guide | £14 |
| BCPL The Language & its Compiler | £8.50 |
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| Computer Graphics & CAD fundamentals | £9.95 |
| Deutsch Direkti (Book only) | £5.95 |
| DNFS Instruction Booklet | £2 |
| Disc Drive Projects for Micros | £6.50 |
| **DISC FILING SYSTEM (DFS) Operating Manual for BBC** | £6.95 |
| File Handling on BBC Micro | £8.50 |
| FORTH-Advanced | £9.95 |
| FORTH-A Text Reference | £19.10 |
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| FORTH on the BBC Micro | £9.95 |
| FORTH-Starting 2nd Edition | £20.85 |
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| Introduction to LOGO | £6.95 |
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| Mastering Assembly Code | £8.95 |
| Mastering CP-M | £17.95 |
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| MINI OFFICE II-A Dabhand Guide | £9.95 |
| PASCAL-Introduction to | £17.95 |
| PASCAL Programming | £9.45 |
| Pick Operating Sys. Practical Guide | £14.95 |
| Practical Disc File Techniques | £5.95 |
| Structured Basic | £7.95 |
| **The Epson FX-KAGA PRINTER Commands REVEALED** | **£5.95** |
| The Software Business | £5.50 |
| Towers Int. Transistor Selectors | £14.95 |
| Understanding Interword - A Beginners Guide | £6.50 |
| Using DOS+ on the 1512 (95% Ok for 512 Bd) | £9.95 |
| View 3.0 User Guide | £10 |
| View Guide (View 2.1) | £4.50 |
| Viewsheet & Viewstore Dabhand Guide | £12.95 |
| Mastering View, Viewsheet & Viewstore | £12.95 |
| VIEW Dabhand Guide | £12.95 |
| Viewsheet User Guide | £10 |
| Viewstore User Guide | £10 |
| Wordprocessing On The BBC Micro | £6.25 |
| Writing Interactive Interpreters & Compilers | £8.45 |
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| Z80 Assembly Language Prog. | £20.95 |
| Z80 Programming the | £19.95 |
| Z88 Computing | £9.95 |
| Z88 Using Your | £9.95 |

**Carriage on Books vary between £1 to £3.50, depending on their weight.**

## BOOKS for IBM PC & Compatibles

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|---|---|
| 1-2-3 For Business 2nd Edition | £20.95 |
| 1-2-3 Command Language | £19.95 |
| 1-2-3 Special Edition (QUE)-Using | £21.95 |
| 8086/8088 Assembly Language Prog. | £12.45 |
| 8086/8088 Programming the | £17.95 |
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| Advanced Tech. in Turbo Pascal | £19.95 |
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| Amstrad PC1512-1640 Step by Step - Using | £8.50 |
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| Business companion on the 1640 | £12.95 |
| CP-M Handbook with MPM | £9.95 |
| CP-M Plus Handbook | £13.95 |
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| dBase III Plus | £12.95 |
| dBase III Plus-Mastering | £21.95 |
| dBase III Plus Handbook 2nd Edition | £20.95 |
| dBase III Plus - tips, tricks and traps (QUE) | £19.95 |
| dBase III Plus-Quick Ref. Guide | £4.95 |
| dBase III Plus-Quick Prog. Guide | £8.95 |
| dBase 4-Understanding | £22.95 |
| DOS Instant Reference (up to 3.3) | £10.95 |
| DOS, Mastering for Versions up to 3.3 | £19.95 |
| DOS Power Tools (includes a disk) | £39.95 |
| DOS Plus Manual/Amstrad PC | £10.95 |
| DOS Plus-Mastering | £12.50 |
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| Hard Disk Manage IBM PC XT AT | £17.35 |
| Hard Disc-Managing your 2nd Ed. | £20.95 |
| IBM PS/2 Handbook | £19.95 |
| IBM PC AT-Inside the | £20.95 |
| Local Area Networks 2nd Generation | £19.95 |
| Lotus 1-2-3 Desktop Companion Soft/B | £24.95 |
| Lotus 1-2-3-Illustrated | £18.45 |
| Mastering 1-2-3 2nd Edition | £19.95 |
| MS-DOS-ABC's of | £16.95 |
| MS-DOS Advanced Programming | £20.95 |
| MS-DOS Handbook 3rd Edition | £18.95 |
| MS-DOS Instant Reference Guide | £10.95 |
| MS/PC DOS 3.3-Illustrated | £18.45 |
| MS-DOS Masters-Tricks of | £22.50 |
| MS-DOS Performance Programming Under | £18.95 |
| MS-DOS Quick Prog Ref Guide | £8.95 |
| MS-DOS Quick Reference Guide | £4.95 |
| MS-DOS-Running 3rd edition | £21.95 |
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| Xerox Ventura Publishing-Inside | £18.45 |

NEW

## The Advanced Reference Manual for the BBC Master

At last Acorn's long awaited Advance Reference Manual for the BBC Master Series of Microcomputers has now been published. Watford Electronics' own authors have edited and added missing sections to the original script and produced a very high quality publication.

It features information about:

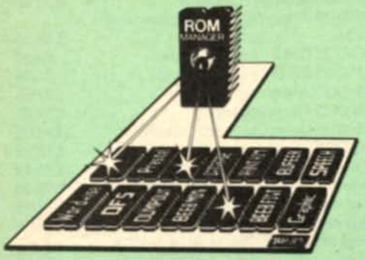
- Memory Organisation
- Slow data bus
- Detailed circuit description
- Keyboard controller
- Screen display
- User port
- Serial Processor
- Peripheral bus controller
- 1 Mhz Bus
- Machine operating System
- Second processors - Internal, Z80 and 80186
- Disc Filing Systems
- ANFS
- Terminal Emulator & Editor
- View internal format
- Detailed differences between Model B, B+, Master 128K and Compact
- Comprehensive appendix on 65C12 instruction set

At the rear of the manual there are pull out circuit diagrams for the Master 128K.
A worth-while addition to any Master owner's library.

**All this for just £17 (NO VAT)**

Continued →

## ROM MANAGER

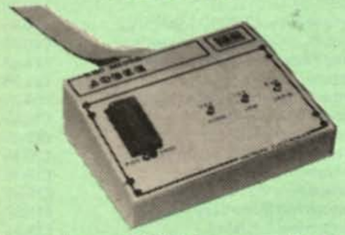


Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.

*"Provides comprehensive management of all your installed ROMs".* (BEEBUG November '84.)

**ONLY £20**

## ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

**£72** (£5 Carr)

## TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

## Servisol Foam Cleaner

This 415Ml, king size multi-purpose foam cleaner spray is ideal for cleaning the Keyboard, Monitor, Disc Drive and your computer furniture surfaces. Simply spray on the surface to clean and wipe off with a clean cloth.

**£2.50**

## SPARES for BBC Micro

| | | | |
|---|---|---|---|
| BBC Keyboard | **£42** | Speaker | **£2** |
| Master Keyboard | **£62** | Keyswitch | **£1.50** |
| UHF Modulator | **£4** | 16MHz Crystal | **£4** |
| Speaker Grill | **£1** | 32.768MHz Xtal | **£1.00** |
| Power Supply | **£56** | Master PSU | **£59** |
| BBC Casing | **£20** | | |

## Replacement FLEXIBLE 17 way Keyboard Connector £3

## Antistatic Aerosol Spray

Ideal for cleaning and preventing static build-up on TV/Monitor Screens.

**£2.50**

## Aerosol Dust Spray

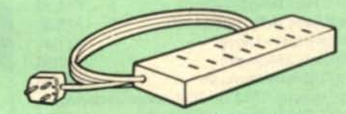
Aerosol Dust Spray
This simple to use aerosol spray is ideal for removing Dust and Dirt deposits from the Keyboards and similar inaccessible places. **£3**

## SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources which put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only **£7.50**

## 4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals.

**£7.95** (carr £1.50)

## SPIKES CLEANER UNIT

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete computer system

**£13.00** (carr. £1.50)

## ROM EXTRACTION TOOL

This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip. **£2**

## 28pin DIL HEADER PLUG

SOLDER type **£1.50**; IDC CRIMP type **£1.95**

## 8 WAY DIP SWITCH

Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ Keyboard.

Only **£1.00**

**28 pin ZIF SOCKET (Textool) £6.95**

## Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below).

**£14**

## Watford POWER DUCK £8

## CONNECTING LEADS

(All ready made and tested)

| | |
|---|---|
| CASSETTE LEADS 7 pin DIN Plug | |
| to 5 pin DIN Plug + 1 Jack Plug | **£2.00** |
| to 3 pin DIN Plug + 1 Jack Plug | **£2.00** |
| to 7 pin DIN Plug | **£2.50** |
| to 3 Jack Plugs | **£2.00** |
| **6 pin DIN to 6 pin DIN Plug (RGB)** | **£2.50** |

### DISC DRIVE POWER LEADS

Supply from BBC power supply to standard Disc Drive connector.
Single **£3.00** Dual **£3.75**

### DISC DRIVE INTERFACE LEADS

BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

## Miscellaneous Connectors

| | Plugs | Sockets |
|---|---|---|
| RGB (6 PIN DIN) | 30p | 45p |
| RS423 (5 pin Domino) | 40p | 50p |
| Cassette (7 pin DIN) | 25p | 65p |
| ECONET (5 pin DIN) | 20p | 30p |
| Paddles (15 pin 'D') | 80p | 200p |
| Disc Drive Plug 4 way | 75p | – |
| 6 way Power Connector | 80p | 95p |

VISA
CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

## CHIP SHOP

| | |
|---|---|
| DS3691 | £4.50 |
| DS88LS120 | £5.25 |
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- 8087-2 maths co-processor, optional.
- 640K minimum expandable to 1024K on system board, extra 384K RAMDISK available.
- 360K Single Floppy (optional 2nd Floppy/3.5"/20MB Winny/T. Streamer).
- CLOCK on System board, gives non stop DATE & TIME.
- 8 expansion slots.
- 102 keys keyboard.
- RS232 with two ports.
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- Microsoft MS DOS 3.30.
- GW-BASIC 3.21.
- Mono graphics/parallel card.
- Legal BIOS and built in games port and clock.

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- Optional 80287 Maths co-processor
- 640K RAM standard expandable on-board to 4MB.
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- CLOCK on System board, gives non stop DATE & TIME.
- 8 expansion slots.
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THE BEEB BODY BUILDING COURSE

# Sounds realistic

## Mike Cook shows you how to emulate natural waveforms

**The Body Build Experimenter's Board was first described in the August 88 Micro User and enables you to learn about interfacing in a relatively painless way. It contains many components which can be interlinked to enable a wide variety of experiments to be performed.**

**WE saw last month how to produce different sounds from the Experimenter's Board's D/A converter. While many different waveform shapes could be generated there wasn't a correspondingly wide range of sounds. As you know, pitch depends on frequency – the more cycles per second there are, the higher is the note. The colour – that's what it sounds like – depends upon the number and size of the harmonics it contains.**

While the phase of these will alter the apparent shape of the waveform, our ears are not sensitive to it and so seemingly different waveforms sound alike.

However, there is another factor in determining a sound. An instrument like a violin does not produce just one type of waveform, but one that changes continuously. A note will start off with one harmonic mixture and end up with a completely different one. So if we are going to be able to synthesise natural sounds we will have to do the same trick.

You will recall that last month we used a waveform table to produce our sound. The contents were calculated first and then we transferred each entry in turn to our D/A converter. The speed at which we did this determined the pitch of the note. As there were 256 entries in our table, any change in the program to affect the table reading speed was multiplied by 256. This gave rather coarse control over the pitch.

A way round this is to not fetch every sample, but to step through the table with a fractional increment. This means that sometimes we will be getting the next sample and sometimes we will miss one out.

Suppose we have a pointer that tells us what sample to fetch from the table. Let's increment this at a rate of 1.4. We can only have integer intervals to look up, so the first sample would be truncated to sample one and when we next increment our pointer – which contains 1.4 – by 1.4 the result is 2.8. So next time we choose sample two.

The next increment brings our pointer to 4.2, so then we use sample four. Note that we have missed out sample three, but maybe we will get it next time we go round the lookup table. As we can specify many different fractions, we can have very fine control over the note's pitch. This is improved by having one of the VIA's timers indicate when we need to fetch the next sample.

How can we represent a pointer that has a fractional part? We could use Basic's representation of floating point numbers but that is a little too complicated for our need. All we do is use two bytes, one to represent the fractional part and the other the whole number of our pointer. We can use a binary fraction notation where bit seven represents 0.5, bit six 0.25 and so on with bit zero standing for 0.00390625 – each successive bit standing for half the previous one. This is the same system that we use for integers, where each bit to the left represents twice that of the bit on the right.

The beauty of this system is that in order to add up the numbers we simply treat them like normal binary values, but only the most significant byte will be used as our pointer for fetching the entry from the lookup table.

Having gained finer control over the pitch of our note, we have to consider how we are going to change the wave shape while it is playing. The answer is simple – we have several tables, and change the one we are using as we progress. We'll program one of the VIA's timers for a short interval and when it times out, we change the waveform table being used.

Just like last month, our new tables need to be pre-calculated, but if we were to apply mathematical formulae to a sequence of waveforms it would be very difficult to get them all correct. And it would take a lot of maths to work out what we needed to feed into the board – that's one of the reasons for having a micro, to do the work for us. What we want is an easy and intuitive way of specifying the sound we want.

Remember I said that the waveshape depended on the number and size of the harmonics used. What we need is a graph of how each will change over the note's duration. This is known as the

| | |
|---|---|
| **&70** | Fractional part of waveform pointer |
| **&71** | Integer part of waveform pointer |
| **&72,&73** | First byte of current waveform table |
| **&74** | Fractional part of waveform pointer increment |
| **&75** | Integer part of waveform pointer increment |
| **&76,&77** | Timer 2 value, length of the note |
| **&78** | Number of waveform tables to use |
| **&79,&7A** | First byte of first waveform table |

*Memory use in synthesiser program*

harmonic's envelope. From it the micro can work out the harmonic content of each waveform table.

The program given will allow you to generate and play sounds consisting of 32 waveform tables each containing up to eight harmonics. Once calculated – and that can take some time – the tables can be saved and recalled later. You can also look at a graph of all the lookup tables as well as the envelope of each harmonic.

When you run the program you will be faced with a menu and you should always press H to choose the number of harmonics to use. This first time enter 2 to simplify matters. Next select D to draw the harmonic envelopes and, when asked for the harmonic number, press 1. Now you will see a graph axis with two arrows pointing underneath. Using the left and right cursor keys you can move one of the arrows – the one that's underlined. Pressing the spacebar will allow you to change the one that moves.

Now press the up key several times and a line will be drawn from the underlined arrow to the other one. Holding down Shift will increase the unit step of the line. Now this line represents the envelope of the first harmonic, so make this start at zero, climb to a peak at the centre of the graph, and drop down again to zero. You will soon find it simple to use the cursor keys to define the envelope.

When you have done this, press Return and answer 2 to the harmonic request. Make the second harmonic start off high at the start and then drop down to zero by the end. Again press Return and type 9 to see all the harmonics on the same graph, type 1 and Return again and finally zero to get back to the menu. This all sounds a lot more complicated that it really is.

## Calculating tables

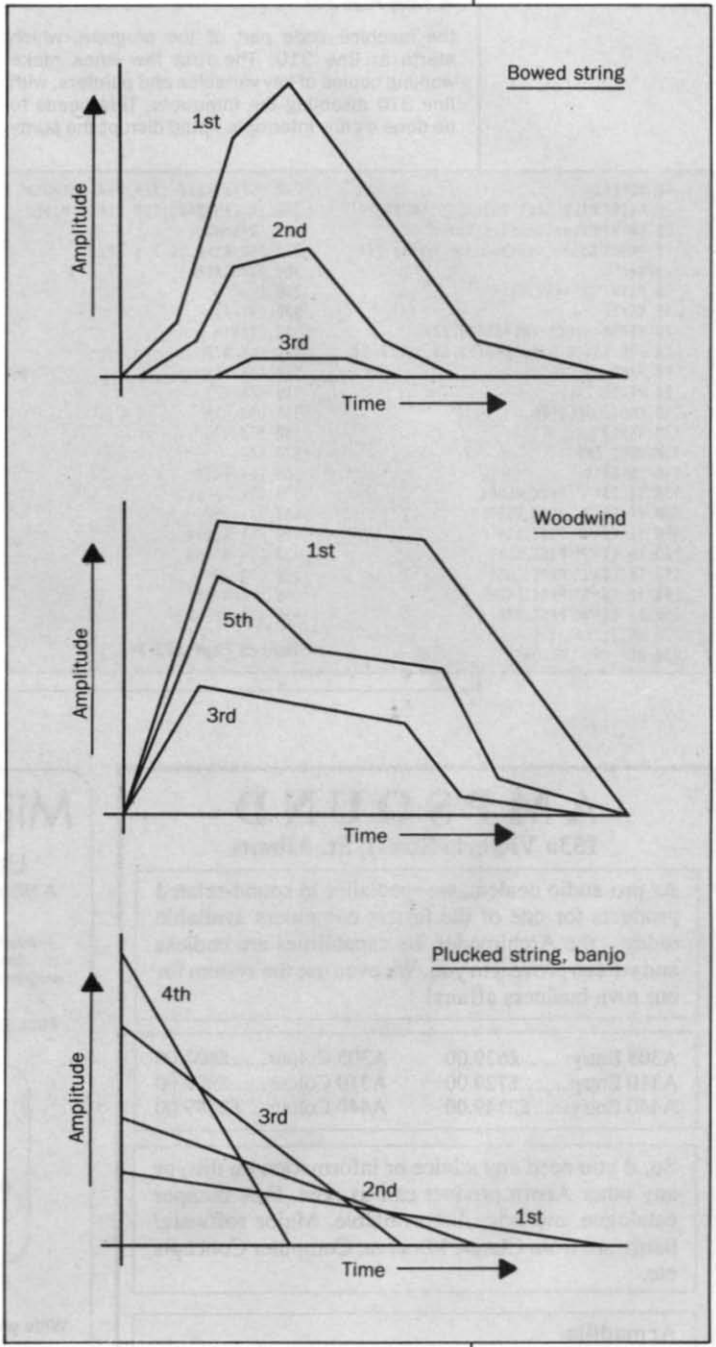
Now with the harmonics defined, press C from the main menu and this will calculate the tables. First it will do a quick search to find the scaling factor to use to ensure that at least one waveform table uses the maximum range of the D/A converter, then it calculates the entries. Now is a good time to make a cup of tea, because it takes about four minutes for each harmonic you have used. To reassure you that your micro hasn't crashed a message tells you what waveform table it is working on. The program beeps to let you know when it has finished.

The first thing to do is to save the waveform tables, using the S option. The program is automatically put in directory T, so if you're using ADFS you'll need:

```
*CDIR T
```

before you start. Now assuming you have the Experimenter's Board plugged in and wired up as last month, you are ready to hear the tone. Choose the play option and press any key – each produces a different pitch. You will instantly appreciate that the sounds are quite different from those you created last month.

Most plucked sounds like a guitar or banjo have harmonic envelopes that start high and then drop off, whereas blown instruments such as flute or trumpet start off low, build up in the middle and then tail off to zero. A bowed string uses the first three harmonics whereas a blown reed uses first, third and fifth. However you are not restricted to real instruments – you can use a mixture of the two basic shapes. The diagrams show you some of the shapes you can try, but like all things, the real fun lies in experimenting with your own.



*Waveforms of various instruments*

The table shows the memory locations used in

**Turn to Page 108 ▶**

◀ *From Page 107*

the machine code part of the program, which starts at line 310: The first few lines make working copies of key variables and pointers, with line 370 disabling the interrupts. This needs to be done as any interrupts would disrupt the purity of the note.

```
   10 MODE4
   20 PRINT"BEEB BODY BUILDING COURSE"
   30 PRINT"Experimenters Board"
   40 PRINT"Sound synthesiser using D/A
converter"
   50 PRINT"By Mike Cook"
   60 N%=32
   70 HIMEM=HIMEM-(N%*256+&200)
   80 DIM CO%(8,31), ANOTE% 65, CLI% 27
   90 PROC_INCODE
  100 PROC_NINT
  110 PROC_COFLS(0)
  120 REPEAT
  130 PROC_INS
  140 C$=GET$
  150 IF C$="V" PROC_WLOOK
  160 IF C$="D" PROC_WSETUP
  170 IF C$="C" PROC_TCALC
  180 IF C$="P" PROC_PLAY
  190 IF C$="L" PROC_LOAD
  200 IF C$="S" PROC_SAVE
  210 IF C$="H" PROC_HAR
  220 UNTIL FALSE
  230 DEF PROC_INCODE
  240 ?&FE63=&FF :REM VIA OUTPUTS
  250 ?&FE6B=&40 :REM TIMER MODES
  260 ?&78=N%
  270 FOR A%=0 TO 2 STEP 2
  280 P%=HIMEM+1
  290 [
  300 OPT A%
  310 .SYNTH
  320 LDX &78
  330 LDA &79
  340 STA &72
  350 LDA &7A
  360 STA &73
  370 SEI
  380 LDA #&E0
  390 STA &FE6E
  400 LDA #50
  410 STA &FE64
  420 STA &FE66
  430 LDA #0
  440 STA &FE67
  450 STA &FE65
```

*Turn to Page 121* ▶

Lines 380 to 490 initialise the two timers and set them running. Lines 510 and 520 loop until T1 times out, then we move the pointer on – lines 540 to 600 – and fetch the table entry and output it to the D/A – lines 620,630.

Next we look to see if timer T2 has timed out and, if not, branch back to the label *HOLD* and get another entry from the lookup table. If it has timed out we need to change the lookup table used – line 710 – then test to see if we have used them all. If we have not we go back and get the next sample otherwise we shut off the timers, enable the interrupts and then return to Basic.

The waveform tables are stored immediately following the code – note that it is saved to disc along with the tables. This would allow you to write another much simpler program just to use the sounds to play tunes.

If you want to speed up the table calculation you could try using a lookup table for the SIN function in line 2570 – otherwise just enjoy the tea.

Well that about wraps it up for this month. There are still lots more projects you can carry out using the Experimenter's Board. However as I have spent several months writing about it, we'll look at a completely different project next month. Those of you with the board need not worry, I will return to it with more projects later on in the year. So, until then the best of sound synthesising.

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The original small 'C' code supplied at cost of distribution on the disc

◀ From Page 89

```
   10 REM Yahtzee
   20 REM by Steven de Rooy and Daniel W
agenaar
   30 REM (c) The Micro User
   40 PROCreloc(&E00):PROCinit
   50 err%=0:ONERRORMODE7:PROCerror
   60 MODE0:VDU23;8202;0;0;0;
   70 PROCboard:REPEATPROCaqx("Enter nam
e player 1"):PRINTTAB(37,2);:N$(0)=FNip:
PROCaqx("Enter name player 2")
   80 PRINTTAB(37,10);:N$(1)=FNip:UNTILN
$(0)<>N$(1):REPEATFORP%=0TO1:PROChil(P%)
:FORQ=0TO4:C%(Q)=0:NEXT:FORT%=0TO2
   90 PROCdice:IFT%<2PROCclaim
  100 IFFNclaimed T%=3
  110 NEXT:PROCchoose:NEXT:UNTILFNfull:W
%=0:Y%=0:FORT=1TO6:W%=W%+FNS(T,0):Y%=Y%+
FNS(T,1):NEXT:X%=0:Z%=0:FORT=7TO13:X%=X%
+FNS(T,0):Z%=Z%+FNS(T,1)
  120 NEXT:A%=W%+X%-35*(W%>62):B%=Y%+Z%-
35*(Y%>62)
  130 MODE4:VDU23;8202;0;0;0;:PROCend:EN
D
  140 DEFPROCinit:DIMN$(1),S%(13,1),SC%(
2,13),T%(2),D%(4),F%(5),C%(4),K$(13),N%(
6),b%256
  150 FORT=1TO13:S%(T,1)=255:S%(T,0)=255
:NEXT:Z%=RND(-TIME):*FX4,1
  160 N$="Yahtzee!":ENDPROC
  170 DEFPROCboard
  180 PROCaqx("SETTING UP BOARD")
  190 PROCi:PRINTTAB(0,0)SPC34N$SPC38
  200 PROCn:X%=430:U%=840:Y%=970
  210 PROCbox(X%,0,U%,Y%)
  220 PROCL(X%,U%,720):PROCL(X%,U%,460)
  230 PROCL(X%,U%,330):PROCL(X%,U%,110)
  240 FOR X%=0 TO 850 STEP850:U%=X%+420
  250 PROCbox(X%,0,U%,Y%)
  260 PROCL(X%,U%,500)
  270 PROCbox(X%+50,50,X%+375,200)
  280 PROCbox(X%+50,556,X%+375,719)
  290 x%=X%+50:u%=X%+375:ix%=(u%-x%)/9
  300 y%=556:v%=719:iy%=(v%-y%)/9
  310 FORQ%=0TO8:dy%=Q%*iy%:dx%=Q%*ix%
  320 MOVEx%,y%+dy%:DRAWx%+dx%,v%
  330 MOVEx%,v%-dy%:DRAWx%+dx%,y%
  340 MOVEu%,y%+dy%:DRAWu%-dx%,v%
  350 MOVEu%,v%-dy%:DRAWu%-dx%,y%
  360 NEXT:NEXT
  370 FOR Q%=0 TO 100
  380 X%=RND(325):Y%=RND(150)
  390 PLOT69,X%+50,Y%+50
  400 PLOT69,1225-X%,Y%+50:NEXT
  410 PROCpl("1",2):PROCpl("2",10)
  420 PRINTTAB(28,18)"Dice: 1 2 3 4 5"TA
B(34,19)"6 6 6 6 6"TAB(34,20)"| | | | |"
TAB(28,22)"Keys:"
  430 PRINTTAB(29,24)"Space   - Roll dic
e"TAB(29,25)" 1- 5   - Claim dice"
  440 PRINTTAB(29,26)"Cursors - Select l
ine"TAB(29,27)"Return  - record it"
  450 FOR X%=2 TO 55 STEP 53:RESTORE690
  460 FOR Q%=0 TO 5:READ P$
  470 PRINTTAB(X%,2+Q%)P$TAB(X%+16,2+Q%)
":.....":NEXT
  480 FOR Q%=0 TO 6:READ P$
  490 PRINTTAB(X%,17+Q%)P$TAB(X%+16,17+Q
%)":.....":NEXT:NEXT
  500 VDU5:MOVE150,650:PRINTN$:MOVE990,6
50:PRINTN$:VDU4:RESTORE690:FORT=1TO13:RE
ADK$(T):NEXT
  510 VDU&8017;&63C1;&1C36;&6C38;&83C6;
  520 ENDPROC
  530 DEFPROCpl(p$,Y%)PRINTTAB(28,Y%)"Pl
ayer "p$":........"TAB(29,Y%+2)"Total sc
ores"
  540 PRINTTAB(28,Y%+4)"Upper part:....0
"TAB(28,Y%+5)"Lower part:....0"TAB(28,Y%
+6)"Overall    :....0":ENDPROC
  550 DEFPROCbox(X%,Y%,U%,V%)
  560 MOVEX%,Y%:DRAWX%,V%:DRAWU%,V%
  570 DRAWU%,Y%:DRAWX%,Y%:ENDPROC
  580 DEFPROCL(X%,U%,Y%)
  590 MOVEX%,Y%:DRAWU%,Y%:ENDPROC
  600 DEFPROCup:Q=Q-1:IFQ=0Q=13
  610 IFS%(Q,P%)<>255 PROCup
  620 ENDPROC
  630 DEFPROCdown:Q=Q+1:IFQ=14Q=1
  640 IFS%(Q,P%)<>255 PROCdown
  650 ENDPROC
  660 DEFFNfull:FORT=1TO13:FORS=0TO1:IFS
%(T,S)=255 T=13:S=1:NEXT:NEXT:=0
  670 NEXT:NEXT:=1
  680 DEFFNS(A,B)IFS%(A,B)=255 =0ELSE=S%
(A,B)
  690 DATA One,Two,Three,Four,Five,Six,T
hree of a kind,Carre,Full house,Little s
treet,Big street,Yahtzee,Chance
  700 DEFFNH(H):IFH<7 =1+H ELSE=H+10
  710 DEFFNsc(P)FORT=1TO6:N%(T)=0:NEXT:F
ORT=0TO4:N%(D%(T))=N%(D%(T))+1:NEXT:IFP<
7 =N%(P)*P
  720 IFP=7=FNthree
  730 IFP=8=FNcarre
  740 IFP=9=FNfullh
  750 IFP=10=FNsmall
  760 IFP=11=FNbigst
  770 IFP=12=FNyahtz
  780 =FNall
  790 DEFFNthree:FORT=1TO6:IFN%(T)>2 T=6
:NEXT:=FNall
  800 NEXT:=0
  810 DEFFNcarre:FORT=1TO6:IFN%(T)>3 T=6
:NEXT:=FNall
  820 NEXT:=0
  830 DEFFNfullh:A=0:FORT=1TO6:IFN%(T)=2
ORN%(T)=3 A=A+N%(T)
  840 NEXT:IFA=5 =25ELSE=0
  850 DEFFNsmall:IFN%(3)=0ORN%(4)=0=0
  860 IF(N%(1)>0ANDN%(2)>0)OR(N%(2)>0AND
N%(5)>0)OR(N%(5)>0ANDN%(6)>0)THEN=30ELSE
=0
  870 DEFFNbigst:IFN%(2)=0ORN%(3)=0ORN%(
4)=0ORN%(5)=0=0
  880 IFN%(1)ORN%(6)=1 =40ELSE=0
  890 DEFFNyahtz:FORT=1TO6:IFN%(T)=5 T=6
:NEXT:=50
  900 NEXT:=0
  910 DEFFNall:A=0:FORT=0TO4:A=A+D%(T):N
EXT:=A
  920 DEFPROCyes:PRINTTAB(P,FNH(R))FNf15
(K$(R))TAB(P+17,FNH(R));
  930 IFS%(R,P%)=255 PRINT"....." ELSEPR
INTSTRING$(5-LENSTR$S%(R,P%),".");S%(R,P
%)
  940 ENDPROC
  950 DEFFNip:PROCi:LOCALI$,L%,V:L%=8
  960 PRINTSTRING$(L%,".")STRING$(L%,CHR
$8);
  970 REPEATG=FNget:IFG>64IFG<91IFV<L%G=
G-32*(V>0):VDUG:I$=I$+CHR$G:V=V+1
  980 IFG=127IFV>0VDUG:PRINT".";:VDU8:V=
V-1:I$=MID$(I$,1,V)
  990 IFG=32IFV<8VDUG:I$=I$+CHR$G:V=V+1
 1000 UNTIL(G=13 AND V>0):PROCn
 1010 PRINTSTRING$(V,CHR$8)I$SPC7:=I$
 1020 DEFPROCaqx(I$):PROCi:PRINTTAB(28,3
0)SPC(24):PRINTTAB(40-LENI$/2,30)I$;:PRO
Cn:ENDPROC
 1030 DEFPROCdice:PROCaqx("Please roll d
ice"):REPEATUNTILFNget=32:PROCaqx("Rolli
ng dice"):REPEAT:FORW%=0TO4:IFC%(W%)=1 G
OTO1050
 1040 R%=RND(6):D%(W%)=R%:PRINTTAB(34+W%
*2,19);R%:IFRND(20)=10C%(W%)=1
 1050 NEXT:PROCkb:UNTILFNclaimed:PRINTTA
B(34,20)"| | | | |":ENDPROC
 1060 DEFPROCclaim:PROCaqx("Please claim
 dice"):REPEAT G%=FNget:IFG%=32 UNTILTRU
E:ENDPROC
 1070 IFG%<49ORG%>53 UNTIL0
 1080 IFC%(G%-49)=0C%(G%-49)=1:PRINTTAB(
34+(G%-49)*2,20)"|" ELSE C%(G%-49)=0:PRI
NTTAB(34+(G%-49)*2,20)"|"
 1090 UNTIL0
 1100 DEFFNclaimed:LOCALT%:FORT%=0TO4:IF
C%(T%)=0T%=4:NEXT:=0
 1110 NEXT:FORT%=0TO4:C%(T%)=0:NEXT:=1
 1120 DEFPROChil(P%)PRINTTAB(34,20)"| |
| | |":PROCi:PRINTTAB(28,2+8*P%)"Player
";P%+1":"N$(P%)STRING$(8-LENN$(P%),".")
 1130 PROCn:PRINTTAB(28,10-8*P%)"Player
";2-P%":"N$(1-P%)STRING$(8-LENN$(1-P%),"
."):ENDPROC
 1140 DEFPROCchoose:IF P% P=55 ELSE P=2
 1150 PROCaqx("Please choose the place")
:PROCkb:PROCos("FX138,0,32"):Q=0:PROCdow
n:A=Q:Q=A:R=A:REPEATQW=FNget:IFQW=139PRO
Cup
 1160 PROCkb:IFQW=138PROCdown
 1170 IFQ<>R PROCyes
 1180 PROCi:PRINTTAB(P,FNH(Q))FNf15(K$(Q
));:PROCn:PRINTTAB(P+17,FNH(Q))FNf5(FNsc
(Q))
 1190 R=Q:UNTILQW=13:PROCkb:PRINTTAB(P,F
NH(Q))FNf15(K$(Q))
 1200 S%(Q,P%)=FNsc(Q):PROCi:PRINTTAB(P+
17,FNH(Q));:IFS%(Q,P%)PRINTFNf5(S%(Q,P%)
)ELSEPRINTSPC5
 1210 PROCn:W=0:Y=0:FORT=1TO6:W=W+FNS(T,
0):Y=Y+FNS(T,1):NEXT:X=0:Z=0:FORT=7TO13:
X=X+FNS(T,0):Z=Z+FNS(T,1)
 1220 NEXT:PRINTTAB(39,6)FNf5(W)TAB(39,7
)FNf5(X)
 1230 PRINTTAB(39,8)FNf5(X+W-35*(W>62))T
AB(39,14)FNf5(Y)
 1240 PRINTTAB(39,15)FNf5(Z)TAB(39,16)FN
f5(Y+Z-35*(Y>62)):ENDPROC
 1250 DEFPROCend:PROCtek:PROCkb:REPEATRE
STORE1390:FORA=1TO13:READB:PROCw:PROCw:P
ROCw:VDU19,1,B;0;:NEXT
 1260 UNTILINKEY0<>-1:RUN
 1270 DEFPROCax(A$,Y%)X%=20-LENA$/2:VDU3
1,X%,Y%:FORT%=1TOLENA$:PROCw:VDUASCMID$(
A$,T%):NEXT:ENDPROC
 1280 DEFPROCtek:PROCax("Yahtzee has jus
t finished",2):PROCax("with the followin
g scores:",4)
 1290 PROCax("Player one: "+N$(0)+" : "+
FNf3(A%),8):PROCax("Player two: "+N$(1)+
" : "+FNf3(B%),11)
 1300 PROCax("This means that "+N$(-(A%<
B%)),15):PROCax("has won the game!",17)
 1310 PROCax("Press a key to play again.
",28):ENDPROC
 1320 DEFFNget:REPEATC%=RND(RND(10000))
```

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MicroLink

Turn to Page 110 ▶

◀ From Page 109

```
1330 C%=INKEY0:UNTILC%<>-1
1340 IF C%=27 err%=27:*FX125
1350 :=C%
1360 DEFPROCerror
1370 IF ERR=17 IF NOTINKEY-1 ENDPROC
1380 REPORT:PRINT" at ";ERL:END
1390 DATA7,3,6,2,5,1,4,4,1,5,2,6,3
1400 DEFPROCos($b%):LOCALX%,Y%:X%=b%
1410 Y%=X%DIV256:CALL&FFF7:ENDPROC
1420 DEFFNf5(N%)=RIGHT$("....."+STR$N%,
5)
1430 DEFFNf3(N%)=RIGHT$("   "+STR$N%,3)
1440 DEFFNf15(k$)=LEFT$(k$+STRING$(15,"
"),15)
1450 DEFPROCkb:PROCos("FX21"):ENDPROC
1460 DEFPROCw:PROCos("FX19"):ENDPROC
1470 DEFPROCi:VDU17,129,17,0:ENDPROC
1480 DEFPROCn:VDU17,128,17,1:ENDPROC
1490 DEFPROCreloc(Q%):P%=PAGE
1500 IF Q%>=P% OR P%>&8000 ENDPROC
1510 L%=TOP-PAGE:*TAPE
1520 FORJ%=0TOL%STEP4:Q%!J%=P%!J%:NEXT
1530 PAGE=Q%:*KEY0OLD|MRUN|M
1540 *FX138,0,128
1550 END
```

**Get it right!**

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = F23D D
  50 = 3B3A 0
  60 = F9A5 4
  70 = 6FE6 6
  80 = 2A7D 3
  90 = 5752 F
 100 = 5EB6 7
 110 = 9411 D
 120 = AD59 8
 130 = 5B96 2
 140 = 350B F
 150 = 599D C
 160 = 7D39 1
 170 = 8FB9 2
 180 = 5821 F
 190 = 8C8B 4
 200 = 9C4F 8
 210 = A512 A
 220 = A0C1 E
 230 = 7951 D
 240 = A77A B
 250 = A512 C
 260 =  8FB 3
 270 = A95A 6
 280 = 1393 B
 290 = 88BA 0
 300 = F06B B
 310 = 9546 3
 320 = 1C3C 5
 330 = 2FD7 1
 340 = BDEC 6
 350 = 8E07 1
 360 = 24BD 1
 370 = 496E 4
 380 = 31CA A
 390 = FEFA 2
 400 =  7E0 4
 410 = 2800 3
 420 = 1F15 0
 430 = 6F4F D
 440 = E980 2
 450 = BA90 B
 460 = 2FF1 C
 470 = 8422 7
 480 = E111 B
 490 = 5366 E
 500 = 20AB D
 510 =  3CA 9
 520 = ED0F 0
 530 = 735B E
 540 = 8EDC 0
 550 = 463A 5
 560 = FAFA C
 570 = 15DD F
 580 = 986F 1
 590 = A2C3 5
 600 = BCC7 A
 610 = 2A09 C
 620 = ED0F 4
 630 = ED5F F
 640 = 66E3 A
 650 = ED0F 6
 660 = 6D7D A
 670 = 6588 1
 680 =   21 3
 690 = 75F3 F
 700 = 934F 9
 710 = FE33 F
 720 = E1EA 2
 730 = 3235 9
 740 = 2E54 8
 750 = F487 1
 760 = E57A C
 770 = 1401 0
 780 = 4225 3
 790 = ED92 2
 800 = FA92 0
 810 = 78D7 B
 820 = FA92 5
 830 = 7F43 F
 840 = 6343 2
 850 = 30B2 5
 860 = DD0C 0
 870 = D903 F
 880 = 26BB E
 890 = C06D 3
 900 = FA92 F
 910 = C70B 0
 920 = 924F D
 930 = A05E 2
 940 = ED0F 1
 950 = 838B 9
 960 = E2D9 9
 970 = 37E2 F
 980 = B0AB 1
 990 = 40B2 6
1000 = BF9E A
1010 =  146 3
1020 = A895 3
1030 = DA13 4
1040 = 94E4 1
1050 = C026 2
1060 = 4781 D
1070 = 23F1 3
1080 = 9045 9
1090 = 53CE 5
1100 = E32E A
1110 = FF2F 4
1120 = 3D8F 5
1130 = B1C3 0
1140 = B726 6
1150 = B7D9 7
1160 = 4189 E
1170 = 1544 C
1180 = 2082 5
1190 = 7170 6
1200 = 56DB 2
1210 = EBA2 8
1220 = 1F1F B
1230 = EF59 1
1240 = 9A51 E
1250 = 37FC A
1260 = 9AE9 5
1270 = F8CC 9
1280 = A73D 0
1290 = 33A2 2
1300 = E8C0 2
1310 = 8ACA D
1320 = 4FEF E
1330 =  DA1 F
1340 = 4760 C
1350 = EFEE 7
1360 = D7A7 6
1370 = DA32 5
1380 =  532 3
1390 = DBCA 7
1400 = 70F3 B
1410 = 3358 6
1420 = 834C A
1430 = E0B8 D
1440 = 7579 4
1450 = FC42 C
1460 =  FAB E
1470 = 3A6B B
1480 = 2217 F
1490 = 3FA5 5
1500 = EC82 2
1510 = 3AB1 6
1520 = 64CA 4
1530 = 6A04 8
1540 = 5DEC C
1550 = FD2E 9
```

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# A sting in the tail

*Product: Scorpion control computer*
*Price: £320.85*
*Supplier: Micro-Robotics Ltd, 264 Newmarket Road, Cambridge CB5 8JR.*
*Tel: 0223 323100*

**COMPUTER control is becoming an increasingly important part of some school syllabuses and the Scorpion is a micro specifically designed for such courses. It's a stand-alone machine from Micro-Robotics of Cambridge designed for control applications with built-in, high level, multi-tasking control language along with high current outputs and an expandable bus.**

The resulting package is quite powerful and should be of interest to anyone undertaking a study in control applications, as well as being suited to a dedicated controller.

At the heart of the Scorpion lies a 6303 chip – a half-way house between a 6800 and a 6809. The board is very well made using the latest in surface mounting component technology. It has 24k of battery-backed user ram, 32k of language rom as well as I/O space and application rom area.

To talk to the Scorpion you need a terminal, which is where the BBC Micro comes in: I received the optional emulator rom for it but any terminal or micro acting as one would do just as well, and the system can be configured to accept a number of different types – including the Z88. The terminal is also used to store programs by creating Ascii spool files.

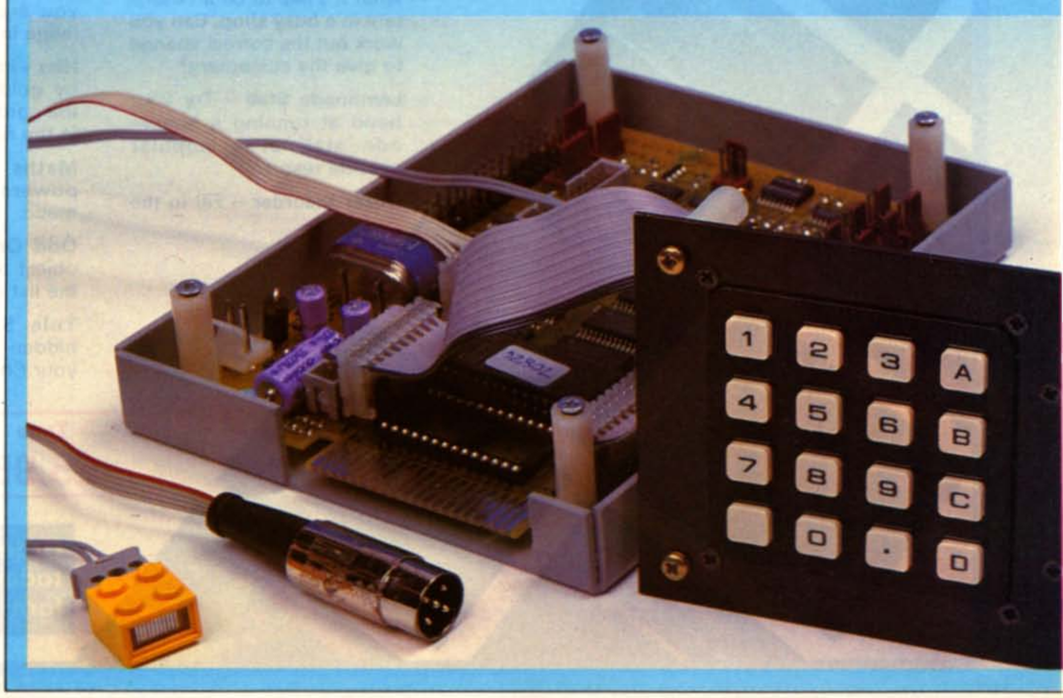
> *'The Scorpion includes a high-level, multi-tasking language'*

The system has a battery backup so it will retain any program from one session to another and the Scorpion board simply bristles with input and output connectors. There are eight sense inputs connected to a 10 bit analogue to digital converter with a sample rate of 4mS. These inputs can also be used to measure the period of a digital waveform to within 1mS.

Two shaft encoder inputs will take the pulse and direction signals from a track ball or a mouse and keep tabs on where it is. Four digital outputs are capable of directly switching 100mA continuously or 500mA peak and another 16 outputs can directly control servo motors or the speed of any DC motor via a controller.

There is a user port consisting of lines connected directly to the 6303 microprocessor and an auxiliary port which is controlled by the address bus. A serial interface allows you to communicate with the micro and connectors for plugging in a keypad and liquid crystal display.

The system has a bus that lets you access all the microprocessor signals so you can attach virtually anything. Finally there is an I2C – pronounced *I squared C* – network which is a four wire bus designed to control many devices from a single port. Philips, which devised it, has a



number of ICs that work on this protocol including D/A and A/D converters, I/O expanders, video displays and infra-red interface chips.

In addition to the standard inputs and outputs Micro-Robotics also offers a number of optional accessories, including a solid state sensor vision system, 8 channel relay module and RS232 driver. In addition there is a 16 channel digital port, parallel printer port and a series of sensors including a platinum resistance thermometer.

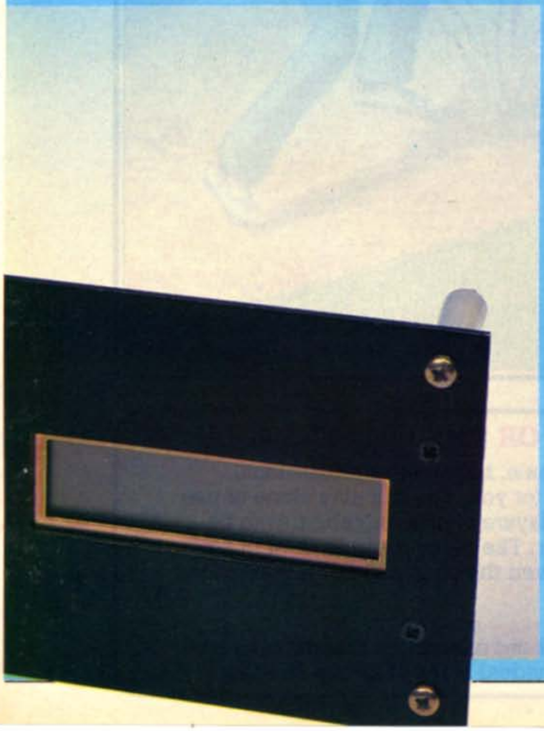
However having all these hardware goodies is only half the story – the Scorpion includes a high level, multi-tasking language that allows you to control them easily. It looks like a cross between Basic, Pascal and Logo, is very readable and should present no problem for any one competent in any high level language.

A program is made up of a number of procedures similar to Logo. As their definitions can be used to define others, the entire control program ends up consisting of one named procedure. To run this you type its name, or to set it going as a background task type START followed by its name.

As the language has been designed for the Scorpion some words deal specifically with the special I/O devices. For example, to turn on output 1 the line:

```
OUTPUT 1 := TRUE
```

# Mike Cook takes control with an experiment board



can be used. Note the use of Pascal's := for *make equal to*.

The servo motors are controlled in an equally straightforward manner: Simply specify the motor to use and what angle you want to place it at. For example, if a motor was connected to a hammer placed in front of a gong the procedure to strike the gong could be written as:

```
TO bong
MOTOR 1
SETANGLE 100
WAIT 500
SETANGLE 0
WAIT 1500
END
```

To summon someone to dinner you could write:

```
TO dinner
bong
bong
bong
END
```

Notice how readable it is – WAIT is a delay word and the number following it is in milliseconds. This can easily be expanded to wait until the real time clock shows 8 o'clock before summoning people to dinner. This can then be set going as a background task, and you can then program some other action. At the appointed time the gong will sound.

The language includes special words to control the LCD, keypad, sense inputs and shaft encoders as well as conventional arithmetic operators and control structures. The manual is more than 150 pages long and includes a simple tutorial in programming the Scorpion.

Each word has its own page and in addition all words are shown as Pascal-like syntax diagrams. The manual also includes a full circuit diagram, parts list and layout diagram.

The system has a spare rom socket which can be used to extend the language either for commercially written routines to control specific devices or your own programs. You can even dump your Scorpion written routines into an eprom emulator.

I found the system very easy to use, although I thought the manual did not make it too clear where to plug the various components and which way round the plugs should be. However having got that sorted out, it was plain sailing. The control language was easy to learn and quite comprehensive.

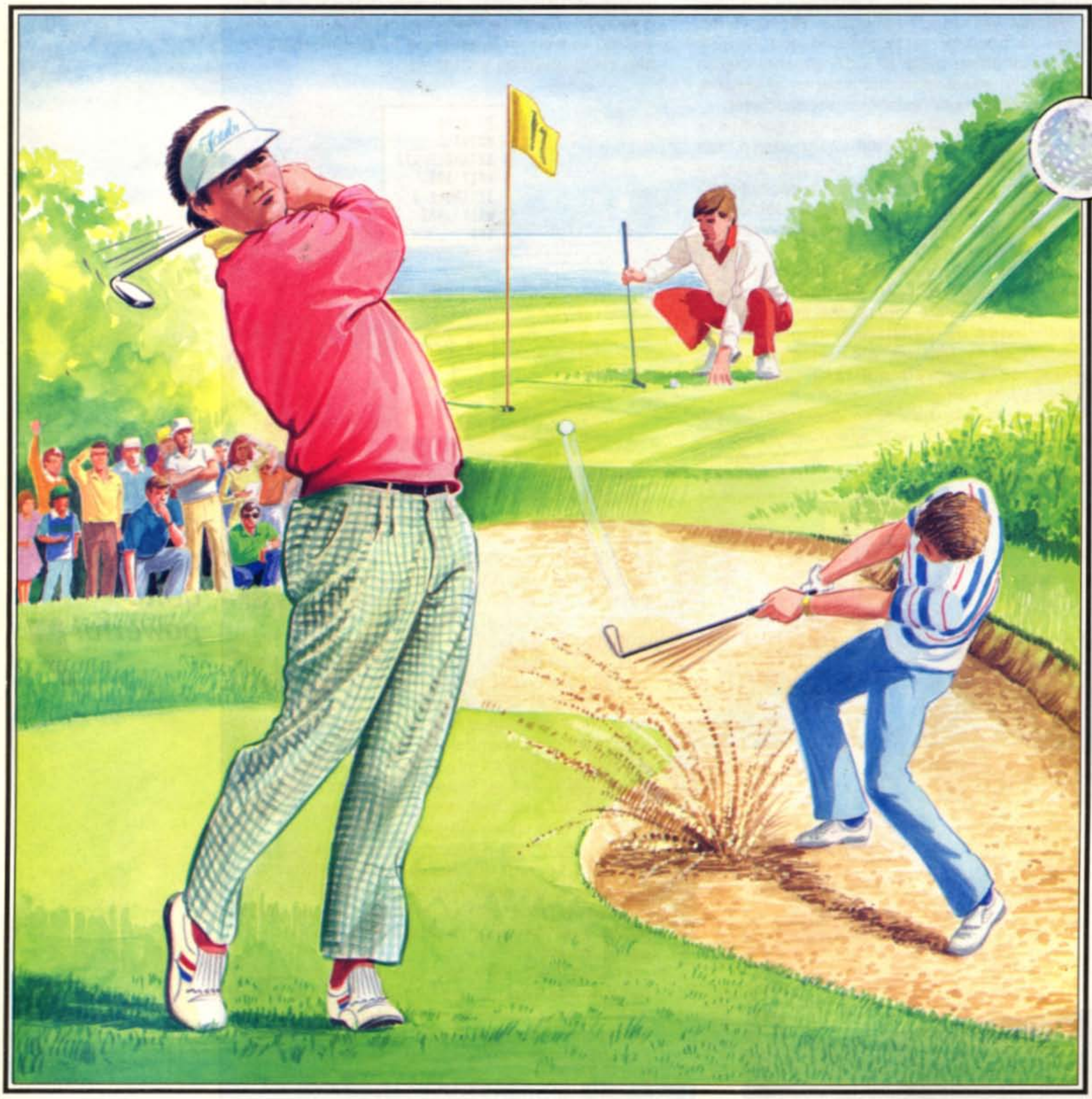
There are provisions for incorporating machine code into routines as well as making changes to the way the system operates. As can be expected, the more complex you want to be with your programming the less readable it becomes.

The Scorpion offers a relatively painless introduction into the world of control: It is well built and its system approach should offer some degree of robustness in a classroom situation. It also offers the opportunity to expand the system and tackle almost any class of control and monitoring problems. I thoroughly recommend it.

> *The resulting package is quite powerful*

BBC MICRO
ACORN ELECTRON
ARCHIMEDES

# HOLED



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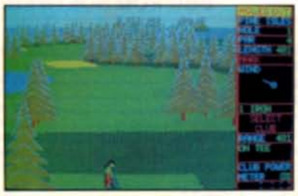
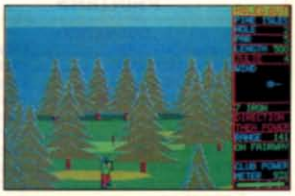
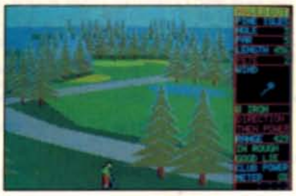
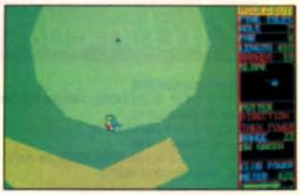
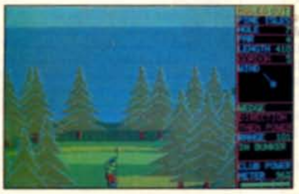
**BBC MICRO**
**ACORN ELECTRON**
**ARCHIMEDES**

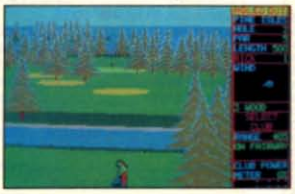

Driving off the 1st tee - a dogleg to the right.

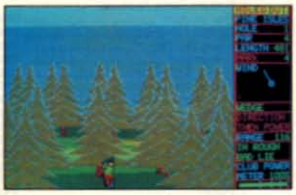

Using a 7 Iron to clear the trees.

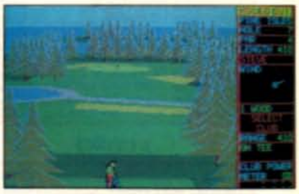

A good lie in the rough but there's a strong wind.


A long put with a tricky slope to the left.


A long bunker shot soars through the air to the green.


A left-handed player aims to clear the canal with a 3 Wood.


A high Wedge shot from a bad lie in the rough.


The Electron version is identical to the BBC version.

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```
  100 IF X%=4 PROCamend
  110 IF X%=5 PROCdelete
  120 IF X%=6 PROCsort
  130 IF X%=7 PROCprint
  140 UNTIL X%>7:*FX4
  150 CLOSE#file%:CLS:END
  160 :
  170 DEFPROCbrowse:PROCcheckcds
  180 PROClobox:PRINT"Use up & down keys
 to browse""and Return to exit...";
  190 IF m$="" cd%=0 ELSE P%=1:L%=LENm$:
cd%=ASCm$
  200 REPEAT PROCdisplay(cd%)
  210 G%=FNget(CHR$138+CHR$139+CHR$13)
  220 IF G%=1 PROCdn ELSEIF G%=2 PROCup
  230 UNTIL G%=3:ENDPROC
  240 :
  250 DEFPROCdn
  260 IF m$="" cd%=cd%-1:IF cd%<0 cd%=nm
cds%-1
  270 IF m$="" ENDPROC
  280 P%=P%-1:IF P%=0 P%=L%
  290 cd%=FNnm(P%):ENDPROC
  300 :
  310 DEFFNnm(P%)=ASCMID$(n$,P%)*256+ASC
MID$(m$,P%)
  320 :
  330 DEFPROCup
  340 IF m$="" cd%=cd%+1:IF cd%=nmcds% c
d%=0
  350 IF m$="" ENDPROC
  360 P%=P%+1:IF P%>L% P%=1
  370 cd%=FNnm(P%):ENDPROC
  380 :
  390 DEFPROCdelete:PROCcheckcds
  400 m$="":cd%=FNgetcd("delete")
  410 PROCdisplay(cd%):PROClobox
  420 PRINTTAB(4,1)"Delete this cd"
  430 PRINTTAB(4,3)"Are you sure (Y/N) ?
";
  440 IF FNget("YyNn")<3 PROCdeletecd
  450 ENDPROC
  460 :
  470 DEFPROCdeletecd
  480 IF cd%=nmcds%-1 PROCnmcds(-1):ENDP
ROC
  490 FOR C%=cd%+1 TO nmcds%-1
  500 PROCrd1(C%):PROCwr1(C%-1)
  510 NEXT:PROCnmcds(-1):ENDPROC
  520 :
  530 DEFPROCsrch:m$="":n$="":s$=""
  540 PROCcheckcds:PROClobox
  550 PRINT"Search on:"
  560 FOR F%=1 TO mxfld%
  570 PRINTfld$(F%,0)" (Y/N) ?";
  580 IF FNget("YyNn")<3 s$=s$+CHR$F%
  590 PRINT:NEXT:IFs$=""ENDPROC ELSE CLS
  600 INPUTTAB(1,1)"Search text: "t$:IF
t$="" ENDPROC
  610 t$=FNlo(t$):CLS
  620 PRINTCHR$136"Searching...";
  630 FOR cd%=0 TO nmcds%-1:m%=FALSE
  640 PROCrd1(cd%):FOR L%=1 TO LENs$
  650 j$=FNlo(fld$(ASCMID$(s$,L%),1))
  660 IFLENj$>LENt$ m%=m%ORINSTR(j$,t$)
  670 NEXT:IF m% m$=m$+CHR$cd%:n$=n$+CHR
$(cd%DIV256)
  680 NEXT:IF m$=""PROCerr("None found")
  690 ENDPROC
  700 :
  710 DEFFNlo($buf%):LOCALB%,L%
  720 FOR L%=0 TO LEN$buf%-1:B%=buf%?L%
  730 IF B%>64 IF B%<92 buf%?L%=B%+32
  740 NEXT:=$buf%
  750 :
  760 DEFFNmenu:VDU26,12:FOR I%=1 TO 2
  770 VDU31,0,I%,129,157,131,141
  780 PRINTSPC7"CARD INDEX"SPC14CHR$156;
:NEXT:VDU28,12,17,29,7,12
  790 PROClobox:PRINT''"Use up/down to c
hoose""and Return to select"
  800 VDU28,12,17,29,4,12
  810 VDU23,1,0;0;0;0;0;
  820 PRINTTAB(3,1)"BROWSE"TAB(3)"ENTER"
TAB(3)"SEARCH"TAB(3)"AMEND"TAB(3)"DELETE
"TAB(3)"SORT"TAB(3)"PRINT"TAB(3)"END";
  830 M%=1:*FX4,1
  840 FORI%=1TO8:VDU31,12,I%,156:NEXT
  850 REPEAT VDU31,0,M%,157,129
  860 G%=FNget(CHR$138+CHR$139+CHR$13)
  870 VDU31,0,M%,32,32
  880 IF G%=1 M%=M%+1:IF M%>8 M%=1
  890 IF G%=2 M%=M%-1:IF M%<1 M%=8
  900 UNTIL G%=3:VDU26,12:=M%
  910 :
  920 DEF PROCsort:PROClobox
  930 m$="":PRINTCHR$136"Sorting...";
  940 LOCAL G%,J%,K%,T%,g%
  950 g%=1:REPEAT g%=g%+g%
  960 UNTIL g%>nmcds%:g%=g%-1
  970 REPEAT g%=g%DIV2
  980 FOR K%=0 TO nmcds%-g%-1:J%=K%
  990 REPEAT G%=J%+g%:PROCcomp
 1000 J%=J%-1:UNTIL J%<0
 1010 NEXT:UNTIL g%=1:ENDPROC
 1020 :
 1030 DEF PROCcomp
 1040 PROCrd1(J%):PROCrd2(G%)
 1050 IF fld$(1,1)>fld$(1,2) PROCwr1(G%)
:PROCwr2(J%) ELSE J%=0
 1060 ENDPROC
 1070 :
 1080 DEFPROCwr1(C%)PROCwr(C%,1):ENDPROC
 1090 :
 1100 DEFPROCwr2(C%)PROCwr(C%,2):ENDPROC
 1110 :
 1120 DEFPROCwr(C%,N%)
 1130 PROCpointto(C%,file%)
 1140 FOR F%=1 TO mxfld%
 1150 PRINT#file%,fld$(F%,N%)
 1160 NEXT:ENDPROC
 1170 :
 1180 DEFPROCrd1(C%)PROCrd(C%,1):ENDPROC
 1190 :
 1200 DEFPROCrd2(C%)PROCrd(C%,2):ENDPROC
 1210 :
 1220 DEFPROCrd(C%,N%)
 1230 PROCpointto(C%,file%)
 1240 FOR F%=1 TO mxfld%
 1250 INPUT#file%,fld$(F%,N%)
 1260 NEXT:ENDPROC
 1270 :
 1280 DEFPROCbox(C%)
 1290 PROChibox(C%):FOR F%=1 TO mxfld%
 1300 PRINTTAB(3)fld$(F%,1):NEXT:ENDPROC
 1310 :
 1320 DEFPROChibox(C%):LOCAL I%
 1330 VDU28,6,16,33,0,12
 1340 FOR I%=0 TO 16
 1350 VDU31,26,I%,156,13,157,129,132
 1360 NEXT:VDU28,9,17,31,1,12
 1370 PRINTTAB(0,1)"Card "C%+1:ENDPROC
 1380 :
 1390 DEFPROClobox
 1400 LOCAL I%:VDU28,1,23,37,18,12
 1410 FOR I%=0 TO 5:VDU31,34,I%,156
 1420 VDU13,129,157,131:NEXT
 1430 VDU28,4,23,33,18,30:ENDPROC
 1440 :
 1450 DEFPROCspace:PROClobox
 1460 PRINTTAB(2,4)"Press space to conti
nue";
 1470 G%=FNget(" "):ENDPROC
 1480 :
 1490 DEFPROCenter
 1500 REPEAT cd%=nmcds%
 1510 IF cd%=mxcds% PROCerr("Box is full
")
 1520 PROCblank:PROCedit(cd%)
 1530 IF fld$(1,1)>"" PROCwr1(cd%):PROCn
mcds(+1)
 1540 UNTIL fld$(1,1)="":ENDPROC
 1550 :
 1560 DEFPROCamend:PROCcheckcds
 1570 cd%=FNgetcd("amend")
 1580 PROCrd1(cd%):PROCedit(cd%)
 1590 PROCwr1(cd%):ENDPROC
 1600 :
 1610 DEFFNgetcd(t$):LOCAL cd%
 1620 REPEAT PROClobox
 1630 PRINTTAB(2)"Card to "t$" (1-";nmcd
s%") :";
 1640 INPUT""cd%
 1650 IFcd%<1ORcd%>nmcds%PROCerr("No suc
```

Turn to Page 120 ▶

## MAJOR PROCEDURES

| | |
|---|---|
| **amend** | Alter a record |
| **blank** | Set up a blank record |
| **browse** | Scan through the data |
| **comp** | Compare two records |
| **createfile** | Make a new data file |
| **delete** | Remove a card |
| **display** | Put up card values |
| **edit** | Alter a record |
| **enter** | Input a new record |
| **hibox** | Set up record display box |
| **init** | Initialise program variables |
| **lobox** | Set up input box |
| **pointto** | Set file pointer to start of a record |
| **print** | Print data file |
| **rd** | Read a record from file |
| **sort** | Put the data file in order |
| **srch** | Search the data file |
| **wr** | Write a record to the file |

## PRINT VARIABLES

| Variable | Meaning |
|---|---|
| ax% | Number of labels across |
| wx% | Width of each print column |
| ex% | Extra lines between each label |

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```
h cd")
 1660 UNTILcd%>0ANDcd%<nmcds%+1:=cd%-1
 1670 :
 1680 DEFPROCedit(cd%):m$="":LOCAL E%
 1690 REPEAT PROCbox(cd%):PROClobox
 1700 FOR F%=1 TO mxfld%
 1710 PRINTfld$(F%,0)": ";:INPUT""i$
 1720 IF i$>"" fld$(F%,1)=LEFT$(i$,flen%
(F%)) ELSEIF fld$(1,1)="" F%=mxfld%
 1730 NEXT:PROCbox(cd%)
 1740 IF fld$(1,1)="" E%=TRUE ELSE PROCl
obox:PRINT"Are these correct (Y/N) ";:E
%=FNget("YyNn")<3
 1750 UNTIL E%:ENDPROC
 1760 :
 1770 DEFPROCinit
 1780 m$=STRING$(255," "):m$=""
 1790 READ mxfld%:size%=0
 1800 DIM fld$(mxfld%,2),flen%(mxfld%)
 1810 FOR F%=1 TO mxfld%
 1820 READ fld$(F%,0),flen%(F%)
 1830 size%=size%+flen%(F%)+2:NEXT
 1840 lns%=6:DIM ln$(lns%-1)
 1850 mxcds%=50:nmcds%=0
 1860 PROCblank:fname$="cards"
 1870 REPEAT file%=OPENUP fname$
 1880 IF file%=0 PROCcreatefile
 1890 UNTIL file%>0:INPUT#file%,nmcds%
 1900 DIM buf%256:ax%=2:wx%=35:ex%=3
 1910 ENDPROC
 1920 :
 1930 DATA 8
 1940 DATA Family name,20
 1950 DATA Given name,20
 1960 DATA Address 1,20
 1970 DATA Address 2,20
 1980 DATA Address 3,20
 1990 DATA Post code,10
 2000 DATA Phone,16
 2010 DATA Notes,20
 2020 :
 2030 DEFPROCcreatefile
 2040 LOCAL file%,cd%:PROClobox
 2050 PRINT"Card file not found..."'"Ma
ke a new file (Y/N) ";
 2060 IF FNget("YyNn")>2 ENDPROC
 2070 CLS:PRINT"Making new file..."
 2080 PROCblank:file%=OPENOUT fname$
 2090 PROCnmcds(0)
 2100 FOR cd%=0 TO mxcds%-1:PROCwr1(cd%)
 2110 PRINTTAB(3,3)cd%+1" records...";
 2120 NEXT:CLOSE#file%:ENDPROC
 2130 :
 2140 DEFPROCnmcds(I%)
 2150 PTR#file%=0:nmcds%=nmcds%+I%
 2160 PRINT#file%,nmcds%:ENDPROC
 2170 :
 2180 DEFPROCdisplay(C%):PROCrd1(C%)
 2190 PROCbox(C%):ENDPROC
 2200 :
 2210 DEFPROCpointto(C%,F%)
 2220 PTR#F%=C%*size%+10:ENDPROC
 2230 :
 2240 DEFFNget(k$):LOCAL I%:*FX21
 2250 REPEAT I%=INSTR(k$,GET$)
 2260 IF I% VDUASCMID$(k$,I%)
 2270 UNTIL I%>0:=I%
 2280 :
 2290 DEFPROCwait:LOCAL T%:T%=TIME+300
 2300 REPEATUNTILTIME>T%:ENDPROC
 2310 :
 2320 DEFPROCblank:LOCAL F%
 2330 FOR F%=1 TO mxfld%
 2340 fld$(F%,1)=STRING$(flen%(F%)," ")
 2350 fld$(F%,1)="":NEXT:ENDPROC
 2360 :
 2370 DEFPROCcheckcds
 2380 IF nmcds%=0 PROCerr("No cards")
 2390 ENDPROC
 2400 :
 2410 DEFPROCprint:PROClobox
 2420 PRINTCHR$136"Printing...";
 2430 IF m$>"" P%=1:L%=LENm$:cd%=ASCm$ E
LSE cd%=0:L%=nmcds%-1
 2440 REPEATFORJ%=0TOlns%-1:ln$(J%)=""
 2450 NEXT:FORA%=1TOax%:PROCrd1(cd%)
 2460 ln$(0)=ln$(0)+FNf(fld$(2,1)+" "+fl
d$(1,1),wx%)
 2470 FORK%=1TO4:ln$(K%)=ln$(K%)+FNf(fld
$(K%+2,1),wx%):NEXT
 2480 IF m$>"" P%=P%+1:cd%=FNnm(P%):IF P
%>L% A%=&7FFFFFFF:J%=A%
 2490 IF m$="" cd%=cd%+1:IF cd%=nmcds% A
%=&7FFFFFFF:J%=A%
 2500 NEXT:*FX3,10
 2510 FORK%=0TOlns%-1:PRINTln$(K%):NEXT
 2520 FORK%=0TOex%:PRINT:NEXT:*FX3,4
 2530 UNTIL J%=&7FFFFFFF:ENDPROC
 2540 :
 2550 DEFFNf(t$,N%)=LEFT$(t$+STRING$(N%,
" "),N%)
 2560 :
 2570 DEFPROCerr(t$):PROClobox
 2580 PRINTt$"Press space to continue";
 2590 G%=FNget(" "):*FX125
 2600 :ENDPROC
 2610 :
 2620 DEFPROCerror:*FX3,4
 2630 IF ERR=17:ENDPROC
 2640 CLOSE#0:REPORT:*FX4
 2650 PRINT" at line ";ERL:END
```

**Get it right!**

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 916A A
  50 = 9621 B
  60 = 48A3 5
  70 = 5CCE 9
  80 = 562B D
  90 = C4FB C
 100 = 1E64 1
 110 =  106 4
 120 = 5F91 A
 130 = D003 F
 140 = F11A A
 150 =  C87 2
 160 = 9719 7
 170 = A314 8
 180 = 6720 0
 190 = FA8C 1
 200 = EDC9 0
 210 =  D06 7
 220 = 1535 C
 230 = 7266 4
 240 = 9719 7
 250 = 5631 A
 260 = FD99 3
 270 = 1310 9
 280 = 1FE6 1
 290 = 7790 E
 300 = 9719 B
 310 = 2DD7 8
 320 = 9719 C
 330 = 958C F
 340 = C567 D
 350 = 1310 3
 360 = F45A 1
 370 = 7790 E
 380 = 9719 9
 390 = 4C28 6
 400 = 8932 0
 410 = C549 D
 420 = D219 2
 430 = EB8E 4
 440 = 8B65 B
 450 = ED0F 6
 460 = 9719 0
 470 = F4D1 1
 480 = B95D 5
 490 = 2991 0
 500 = B96B 2
 510 = 3F6B 9
 520 = 9719 D
 530 = 4FED E
 540 = 45C0 5
 550 = E702 B
 560 = 7F53 8
 570 = D283 1
 580 = F8B6 F
 590 = 229E C
 600 = 9716 4
 610 = AFCE 5
 620 = 37BE 3
 630 = A47A 7
 640 = 6117 3
 650 = D18B 4
 660 = 11D7 C
 670 = 7D50 3
 680 = BBD8 7
 690 = ED0F A
 700 = 9719 7
 710 = 8676 D
 720 = 24BB 2
 730 = E36C C
 740 = 3EEA 2
 750 = 9719 3
 760 = 224B A
 770 = 40A0 5
 780 = 5CC9 5
 790 = C476 0
 800 = 6636 F
 810 = 8EF3 9
 820 = CDDA B
 830 = 7656 D
 840 =  26B 4
 850 = 47AC 4
 860 =  D06 8
 870 = 2D98 7
 880 = AEEB 1
 890 = 729F 1
 900 = 7F74 E
 910 = 9719 3
 920 = 606D 2
 930 = A308 2
 940 = E428 E
 950 =  47F 9
 960 = 429A A
 970 = B27F 8
 980 = 54E0 A
 990 = C98E B
1000 = 323E 2
1010 = 158C B
1020 = 9719 F
1030 = 930C 9
1040 = BD2A 7
1050 = 941E 4
1060 = ED0F 6
1070 = 9719 A
1080 = 1C1E 4
1090 = 9719 C
1100 = 6F8F 2
1110 = 9719 5
1120 = 33E7 F
1130 = A5A9 A
1140 = 7F53 9
1150 = F327 6
1160 = E531 7
1170 = 9719 2
1180 = ABC3 3
1190 = 9719 7
1200 = D852 8
1210 = 9719 B
1220 = F954 B
1230 = A5A9 8
1240 = 7F53 E
1250 = 8D5B C
1260 = E531 1
1270 = 9719 0
1280 = C3EC 2
1290 = 3C26 C
1300 = B729 E
1310 = 9719 7
1320 = 66F3 2
1330 = A72D B
1340 = 8E7B F
1350 = 521A 6
1360 = 3E68 F
1370 = B43C 6
1380 = 9719 B
1390 = BFD3 5
1400 = 2825 F
1410 =  355 E
1420 =  7C5 F
1430 = F14F 7
1440 = 9719 4
1450 = 390F 5
1460 = D59B B
1470 = E193 5
1480 = 9719 F
1490 = DE59 B
1500 = DFFC 4
1510 = 51DE 2
1520 = 94CD A
1530 = 8958 A
1540 = 468A 2
1550 = 9719 8
1560 = 635A 6
1570 = 7701 2
1580 = AEDE C
1590 = 5537 9
1600 = 9719 A
1610 = F9F5 C
1620 = 7F72 F
1630 = 91FE D
1640 = 6179 4
1650 = 872F 0
1660 = 450C 4
1670 = 9719 6
1680 = 7458 4
1690 = 72CF E
1700 = 7F53 9
1710 = 6F53 B
1720 = E409 E
1730 = 1786 C
1740 = 8380 E
1750 = 6FF5 D
1760 = 9719 E
1770 = 344C E
1780 = 9FB5 D
1790 = BC97 8
1800 = 10B8 F
1810 = 7F53 C
1820 = B8D2 A
1830 = 5BB2 5
1840 = 7A7E 2
1850 = 8ADD 2
1860 = BDAA F
1870 = 9FD1 0
1880 = A7E3 4
1890 = 6509 A
1900 = 8309 4
1910 = ED0F 5
1920 = 9719 7
1930 = A148 8
1940 = D58C B
1950 = F96F 2
1960 = 8DA0 D
1970 = 167C 3
1980 = 60C8 2
1990 = 5B90 1
2000 = 9387 A
2010 = 1514 2
2020 = 9719 5
2030 = EE69 6
2040 = 5D98 0
2050 = D7F4 9
2060 = 9CA8 6
2070 =  B4C 9
2080 = BABF E
2090 = DF85 3
2100 = 25FA 8
2110 = B4B5 7
2120 = AF49 7
2130 = 9719 F
2140 = BAEF A
2150 = 1A9D 9
2160 = 603D 9
2170 = 9719 1
2180 = BC30 3
2190 = CB36 A
2200 = 9719 3
2210 = 5662 7
2220 = 2AE2 4
2230 = 9719 5
2240 = 29B4 5
2250 = C574 0
2260 = DF0E 2
2270 =  F1E 5
2280 = 9719 6
2290 = 77A3 6
2300 = 5D4E 1
2310 = 9719 E
2320 = 3BB2 0
2330 = 7F53 2
2340 = 5CBE 4
2350 = E164 E
2360 = 9719 A
2370 = DA0C D
2380 =  FA6 3
2390 = ED0F 4
2400 = 9719 0
2410 = F23C 0
2420 = E841 3
2430 = 3648 4
2440 = DD15 3
2450 = 540E 9
2460 = 1CC2 7
2470 =  2FE 7
2480 = 80B6 B
2490 = 5194 B
2500 = E737 2
2510 = D37D E
2520 = 8893 6
2530 = 9247 E
2540 = 9719 5
2550 = 77EC 6
2560 = 9719 6
2570 = FA1E F
2580 = 6DF0 D
2590 = 6A0D 2
2600 =  751 8
2610 = 9719 0
2620 = ED36 2
2630 = E2DD 4
2640 = 1625 4
2650 = 65A1 9
```

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```
 460 .ST2 LDA #&FF
 470 STA &FE68
 480 LDA &76
 490 STA &FE69
 500 .HOLD LDA #&40
 510 .HOLD2 BIT &FE6D
 520 BEQ HOLD2
 530 STA &FE6D
 540 CLC
 550 LDA &74
 560 ADC &70
 570 STA &70
 580 LDA &75
 590 ADC &71
 600 STA &71
 610 LDY &71
 620 LDA (&72),Y
 630 STA &FE61 \ OUTPUT TO D/A
 640 LDA #&20
 650 BIT &FE6D
 660 BEQ HOLD
 670 STA &FE6D
 680 INC &73
 690 DEX
 700 BNE ST2
 710 LDA #&60
 720 STA &FE6E
 730 LDA #128
 740 STA &FE61
 750 CLI
 760 RTS
 770 NOP
 780 .TSTART
 790 ]
 800 NEXT
 810 ?&79=TSTART MOD 256
 820 ?&7A=TSTART DIV 256
 830 ENDPROC
 840 DEF PROC_NINT
 850 LOCAL F,FI,R
 860 FOR C%=1 TO 4
 870 RESTORE 1000
 880 FOR A%=ANOTE%+(C%-1)*14 TO ANOTE%+
(C%-1)*14+12 STEP 2
 890 READ F
 900 IF C%<>2 F=F*2^(C%-2)
 910 FI=F*256*50E-6
 920 ?A%=INT(FI)
 930 T%=0
 940 R=FI-INT(FI)
 950 FOR B%=1 TO 8
 960 IF R>2^-B% R=R-2^-B%:T%=T%+2^(8-B%
)
 970 NEXT
 980 A%?1=T%
 990 NEXT:NEXT
1000 DATA 261.6256,293.6648,329.6276
1010 DATA 349.2282,391.9954,440.000
1020 DATA 493.8833,523.2511
1030 ENDPROC
1040 DEF PROC_PLAY
1050 CLS
1060 PRINTTAB(0,11)"RETURN key to end"
1070 ?&76=&10
1080 REPEAT
1090 X%=GET
1100 K%=2*(X% AND 31)
1110 ?&74=ANOTE%?(K%+1)
1120 ?&75=ANOTE%?K%
1130 CALL SYNTH
1140 UNTIL X%=13
1150 ENDPROC
1160 DEF PROC_WDISPLAY
1170 FOR H%=0 TO NHAR%-1
1180 PROC_HDISPLAY
1190 NEXT
1200 ENDPROC
1210 DEF PROC_HDISPLAY
1220 MOVE 156,1024
1230 DRAW 156,508
1240 DRAW 935,508
1250 S%=0
1260 U%=31
1270 PROC_DISPART
1280 ENDPROC
1290 DEF PROC_WSETUP
1300 L%=144
1310 R%=344
1320 A%=0
1330 PRINTTAB(0,23)"9 To view all"
1340 PRINT
1350 PRINT"0 To return to menu"
1360 PRINT
1370 PRINT "HARMONIC TO VIEW  (1-";NHAR
%")?";
1380 H%=GET AND 15
1390 IF H%<>9 AND H%>NHAR% THEN 1370
1400 H%=H%-1
1410 CLS
1420 IF H%<0 PROC_COFLS(1):ENDPROC
1430 IF H%>7 PRINTTAB(0,17)"Here's the
lot then":PROC_WDISPLAY:GOTO 1370
1440 PROC_HDISPLAY
1450 PRINTTAB(0,19)"Use cursor keys to
draw HARMONIC No. ";H%+1
1460 PRINT"SPACE BAR alternates arrows"
1470 PRINT"SHIFT held down increases st
ep size"
1480 PRINT"RETURN to view a new harmoni
c"
1490 *FX4,1
1500 VDU 5
1510 MOVE L%,480:VDU94
1520 MOVE R%,480:VDU94
1530 PROC_AUPD
1540 REPEAT
1550 *FX15,0
1560 A$=GET$
1570 B%=ASC(A$)
1580 IF A$=" " PROC_AUPD:A%=A% EOR 1:PR
OC_MARROW(A%,0)
1590 IF B%=136 OR B%=137 PROC_MARROW(A%
,B%)
1600 IF B%=138 OR B%=139 PROC_ADJUST
1610 UNTIL B%=13
1620 *FX4,0
1630 VDU4
1640 GOTO 1330
1650 ENDPROC
1660 DEF PROC_MARROW(A%,B%)
1670 IF B%=136 B%=-25
1680 IF B%=137 B%=25
1690 GCOL 3,1
1700 IF A% MOVE L%,480 :L%=L%+B% ELSE M
OVE R%,480:R%=R%+B%
1710 IF B%<>0 VDU95,8,94
1720 GCOL 0,1
1730 IF L%<144 OR L%>919 L%=L%-B%
1740 IF R%<144 OR R%>919 R%=R%-B%
1750 MOVE L%,480:PRINTCHR$94
1760 MOVE R%,480:PRINTCHR$94
1770 PROC_AUPD
1780 ENDPROC
1790 DEF PROC_AUPD
1800 GCOL 3,1
1810 IF A% MOVE L%,480 ELSE MOVE R%,480
1820 VDU95
1830 GCOL 0,1
1840 ENDPROC
1850 DEF PROC_ADJUST
1860 IF R%=L% ENDPROC
1870 S%=(R%-144)/25
1880 U%=(L%-144)/25
1890 IF A% Z%=U% ELSE Z%=S%
1900 IF S%>U% T%=S%:S%=U%:U%=T%
1910 GCOL 0,0
1920 PROC_DISPART
1930 GCOL 0,1
1940 IF B%=139 B%=4 ELSE B%=-4
1950 IF INKEY(-1) B%=B%*8
1960 CO%(H%,Z%)=CO%(H%,Z%)+B%
1970 IF CO%(H%,Z%)>255 OR CO%(H%,Z%)<0
CO%(H%,Z%)=CO%(H%,Z%)-B%
1980 T%=0
1990 D=(CO%(H%,U%)-CO%(H%,S%))/ABS(U%-S
%)
2000 FOR W%=S% TO U%
2010 CO%(H%,W%)=CO%(H%,S%)+D*T%
2020 T%=T%+1
2030 NEXT
2040 PROC_DISPART
2050 ENDPROC
2060 DEF PROC_DISPART
2070 IF S%<>0 F%=S%-1 ELSE F%=S%
2080 IF U%<>31 T%=U%+1 ELSE T%=U%
2090 FOR D%=F% TO T%
2100 X%=160+D%*25
2110 Y%=CO%(H%,D%)*2+512
2120 IF D%=F% MOVE X%,Y% ELSE DRAW X%,Y
%
2130 NEXT
2140 ENDPROC
2150 DEF PROC_COFLS(D%)
2160 A%=TSTART+N%*256
2170 IF D%=1 THEN ?A%=NHAR% ELSE NHAR%=
?A%
2180 A%=A%+1
2190 FOR W%=0 TO 31
2200 FOR H%=0 TO 7
2210 IF D%=1 THEN ?A%=CO%(H%,W%) ELSE C
O%(H%,W%)=?A%
2220 A%=A%+1
2230 NEXT
2240 NEXT
2250 ENDPROC
2260 DEF PROC_TCALC
2270 CLS
2280 PRINTTAB(0,10)"This will take some
 time"
2290 PRINT"First, calculating the scali
ng factor"
2300 PRINT"For all ";N%;" tables"
2310 PRINT"Working on:-"
2320 MAX=0
2330 HPI=PI/2
2340 FOR T%=0 TO N%-1
2350 PRINTTAB(0,14)"Table No.";T%+1
2360 FOR H%=1 TO 8
2370 FOR P%=0 TO H%/2
2380 F=HPI/H%+(2*PI*P%)/H%
2390 CVAL=0
2400 FOR B%=0 TO NHAR%-1
2410 CVAL=CVAL+CO%(B%,T%)*SIN(F*(B%+1))
2420 NEXT
2430 IF CVAL>MAX MAX=CVAL
2440 NEXT:NEXT:NEXT
2450 PRINT
2460 MAX=MAX+4
2470 PRINT"NOW calculating the tables"
2480 PRINT
2490 PRINT"This will take about ";NHAR%
*4;" Mins"
2500 SF=127/MAX
2510 A%=TSTART
2520 FOR T%=0 TO N%-1
2530 PRINTTAB(0,19)"Table No.";T%+1
2540 FOR F=0 TO 2*PI STEP 2*PI/255
2550 CVAL=0
2560 FOR B%=0 TO NHAR%-1
2570 CVAL=CVAL+CO%(B%,T%)*SIN(F*(B%+1))
2580 NEXT
2590 ?A%=127+SF*CVAL
2600 A%=A%+1
```

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# MICRO USER CLASSIFIEDS

- ● BBC B issue 7, Acorn DFS, + Opus challenger, 32k Rom1 Ram, joystick, lots of software, books, magazines. All for £365. Tel: 01-947 2698 (evenings)
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- ● BBC B Torch CPM, Z80 2nd processor 20M, Winchester colour monitor £700 ono. Tel: 0784 57949.
- ● Pace Nightingale modem and Commstar £40. Beeb teletext adaptor and ATS £40. Tel: 031-228 2052.
- ● BBC B Watford DFS single disc drive 40/80T, Wordwise Plus, Wordaid, joysticks, games. Excellent condition £290. Tel: 01-866 9808.
- ● Master 128, C/Monitor, twin drives/plinth, teletext, AMX III mouse, Stop Press, Fax File, Bank Master + much more. £720 also printer. 0582 603287 (evenings).
- ● Prism 2000 modem together with Micronet 2000 version 1.2. Tel: 0249 712796 (evenings).
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- ● BBC B with Watford DDFS and vine micros replay £210, Watford 40/80T disc drive £60. Tel: 061-962 9068.
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- ● Wanted urgently for a BBC B, a Micro Voice by R&D Speech Technology or Micro Voice Basic. Tel: Chris 0679 64139.
- ● BBC B, 128k SWR/ram-disc, 1770/8271 disc interface, 40/80T SS/drive, green screen monitor, Interword, Intersheet, manuals, books, software, bargain, £450. Tel: 0784 256902.
- ● BBC B, Dual 40/80 Track drives software, books all immaculate, £275 ono. Daisywheel printer, superb £100. Tel: (0926) 56546.
- ● Apple Europlus twin drives, parallel interface, card, soft card, language card. Box of software inc Visicalc with manual. Tel: (Biggin Hill) 0959 73360, £350.
- ● Z88 with 128k, 32k rampacks, 32k eprom, mains adaptor, parallel printer cable, Z88 book £295. Star LC-10 printer, £125. All boxed. Tel: 041-637 9029.
- ● Archimedes PC emulator, unused, sealed, £85 ono. Tel: Bill 0304 372933.
- ● Micro Users: Vol 1 (Not No. 1) Vols 2,3,4, £5 each. £12 for all. Add P&P or collect. Tel: 01-658 3479.
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- ● BBC B.7 Watford Mk2 DDFS 1770 replay rom 40/80 drive, datacorder, games, mags and manuals, £325 ovno. Tel: 0737 243720.
- ● BBC B issue 7 OS 1.2 cassette recorder joystick over £350 worth of original software including Mini Office II and Trivial Pursuit manual, books and magazines, £250 ono. Tel: 0256 477493 evenings.
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- BBC B issue 3 1770 DFS ATPL sidewise rom/ram board Aries B20, Aries B32, Aries B12. Watford shadow board, Solidisk 2 Meg128k. Tel: 01-458 1489 (not Friday or Saturday) Michael.
- BBC B issue 7, Watford DDFS, 32k shadow ram, twin DS DD 40/80T switchable drives, ATPL rom board: Interbase Interword, Intersheet, Interchart, BCPL, graphics, Printmaster, Sleuth, Toolkit. MP-165 dot matrix printer with paper and labels. Microvitec cub monitor, Sanyo Datacoder, diskettes, mags, manuals, books. All immaculate, hardly used. £1,000 ono, will split. Tel: Colin (0272) 512661 after 6pm.
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◀ *From Page 121*

```
 2610 NEXT
 2620 NEXT
 2630 SOUND 1,-15,65,12
 2640 ENDPROC
 2650 DEF PROC_WLOOK
 2660 CLS
 2670 PRINT"WAVEFORM PLOTTER"
 2680 PRINTTAB(0,8)"SPACE BAR for next w
aveform"
 2690 PRINT"B - key for BACK"
 2700 PRINT"RETURN - to end"
 2710 A%=GET
 2720 IF A%=13 ENDPROC
 2730 A%=TSTART
 2740 T%=0
 2750 REPEAT
 2760 CLS
 2770 PRINTTAB(0,0)"WAVEFORM TABLE No.";
T%+1
 2780 MOVE 0,?A%*4
 2790 A%=A%+1
 2800 FOR X%=4 TO 1023 STEP 4
 2810 DRAW X%,?A%*4
 2820 A%=A%+1
 2830 NEXT
 2840 X%=GET
 2850 IF X%<>&42 T%=T%+1 ELSE T%=T%-1:A%
=A%-512
 2860 IF T%<0 OR T%>(N%-1) T%=0
 2870 IF T%=0 A%=TSTART
 2880 UNTIL X%=13
 2890 ENDPROC
 2900 DEF PROC_SAVE
 2910 PROC_COFLS(1)
 2920 PROC_NAME("SAVE the table in")
 2930 $CLI%="SAVE T."+F$+" 3600 5800"
 2940 PROC_IMPLEMENT
 2950 ENDPROC
 2960 DEF PROC_LOAD
 2970 PROC_NAME("LOAD the table from")
 2980 $CLI%="LOAD T."+F$
 2990 ON ERROR GOTO 3040
 3000 PROC_IMPLEMENT
 3010 ON ERROR OFF
 3020 PROC_COFLS(0)
 3030 ENDPROC
 3040 REPORT
 3050 TIME=0
 3060 REPEAT:UNTIL TIME>300
 3070 RUN
 3080 DEF PROC_NAME(A$)
 3090 CLS
 3100 PRINTTAB(0,8)"WAVEFORM TABLE STORA
GE"
 3110 PRINT"Input file name to ";A$
 3120 INPUT F$
 3130 ENDPROC
 3140 DEF PROC_IMPLEMENT
 3150 X%=CLI% MOD 256
 3160 Y%=CLI% DIV 256
 3170 CALL &FFF7
 3180 ENDPROC
 3190 DEF PROC_HAR
 3200 REPEAT
 3210 INPUT"NUMBER OF HARMONICS TO USE 1
-8 ",NHAR%
 3220 UNTIL NHAR%<9 AND NHAR%>0
 3230 ?(TSTART+N%*256)=NHAR%
 3240 ENDPROC
 3250 DEF PROC_INS
 3260 CLS
 3270 PRINT"SOUND SYNTHESISER"
 3280 PRINT"Using ";NHAR%;" harmonics"
 3290 PRINT
 3300 PRINT
 3310 PRINT"D - DRAW the harmonic envelo
pes"
 3320 PRINT"C - CALCULATE the waveforms"
 3330 PRINT"V - VIEW the waveforms in th
e table"
 3340 PRINT"P - PLAY the notes from the
keyboard"
 3350 PRINT"H - Change the number of HAR
MONICS used"
 3360 PRINT"S - SAVE the waveform tables
"
 3370 PRINT"L - LOAD the waveform tables
"
 3380 PRINT
 3390 PRINT"Make your choice"
 3400 ENDPROC
```

**Get it right!**

```
  10 = BA9F F
  20 = A5F9 C
  30 = D0F6 7
  40 = 954F 4
  50 = FC23 2
  60 = 94E8 9
  70 = D409 D
  80 = D31F 9
  90 = 43D2 8
 100 = 117F 5
 110 = 1400 8
 120 = BFBA 7
 130 = 1D69 5
 140 = 9A9A B
 150 =  C8A 6
 160 = 7E11 9
 170 = AF0A 5
 180 = D7E8 8
 190 = FF5F D
 200 = 6A78 A
 210 = 22E8 E
 220 = 226C 7
 230 = 6EAD A
 240 = AC3C C
 250 = 5589 6
 260 = 746D D
 270 = BFB0 C
 280 = 931F 1
 290 = EB9E 8
 300 = C917 4
 310 = C51C 9
 320 = DC58 D
 330 = 605F B
 340 = 7622 9
 350 = 9FC0 D
 360 = 6603 D
 370 = 2C4A 1
 380 = 80D7 6
 390 = 78D4 E
 400 = 7CE4 D
 410 = 1662 C
 420 = 3620 B
 430 =  295 9
 440 = 2601 F
 450 =  643 B
 460 = 1941 5
 470 = D7EE 1
 480 = 91B0 4
 490 = C7CF B
 500 = 969A C
 510 = 3DDA 3
 520 = 56CC 8
 530 = 68F5 7
 540 = 74FB 4
 550 = B1F2 0
 560 = 5FFF 4
 570 = 5660 E
 580 = A1D3 1
 590 = 4FDE 3
 600 = 4641 5
 610 = E720 2
 620 = D8A8 4
 630 = CB60 B
 640 = 1119 7
 650 = F524 D
 660 = 7A9F D
 670 = 68F5 1
 680 = 7A33 A
 690 = E8A9 D
 700 = 8139 A
 710 = DDDD F
 720 = 78D4 9
 730 = 56E2 1
 740 = 46C7 7
 750 = D5B1 0
 760 = 9843 8
 770 = 41AB 9
 780 = 3650 8
 790 = 8B58 1
 800 = 2C83 6
 810 = 9613 0
 820 = 497C 6
 830 = ED0F B
 840 = 1F08 0
 850 = 18D8 2
 860 = 47B5 5
 870 =  878 B
 880 = EC44 E
 890 = 94E6 8
 900 = 2FB0 9
 910 = C4A2 6
 920 = 9C1D C
 930 = 9766 A
 940 = 5E91 7
 950 = C1EA 1
 960 = B9F0 A
 970 = 2C83 1
 980 = 1186 8
 990 = 24BD 9
1000 = D1E0 6
1010 = FEF9 2
1020 = ABF7 B
1030 = ED0F 4
1040 = 8C96 D
1050 = 7A16 3
1060 = 4119 7
1070 = 5795 B
1080 = BFBA 4
1090 =  B48 F
1100 = ED70 2
1110 =  E7D 9
1120 = 685E D
1130 = A5F4 1
1140 = DBEE 4
1150 = ED0F F
1160 = AF1C C
1170 = 1950 A
1180 = B4A8 1
1190 = 2C83 E
1200 = ED0F B
1210 = 4B6A 0
1220 = 65AE B
1230 = F844 B
1240 =  8DA 2
1250 = C64B B
1260 = 4C2E A
1270 = 289A 0
1280 = ED0F 8
1290 = 3777 4
1300 = 126C 7
1310 = E62B A
1320 = 3084 C
1330 = E5C9 E
1340 = FF3E 3
1350 =  997 8
1360 = FF3E 6
1370 =  86F 7
1380 = 5746 B
1390 = 7F15 C
1400 = C57D 2
1410 = 7A16 1
1420 = CA5A 2
1430 = 6EBE A
1440 = B4A8 9
1450 = FE8B 4
1460 = 3E03 A
1470 = C5FB D
1480 = 83BD 9
1490 = E383 3
1500 = EC10 3
1510 = 3D3F B
1520 = 905D 2
1530 = C1DE 7
1540 = BFBA 4
1550 = 6C86 C
1560 = 77F2 D
1570 = A9CF 0
1580 = A3E9 8
1590 = A75E B
1600 = DA3D E
1610 = 991A 9
1620 = F3A2 C
1630 = 765B B
1640 = D067 F
1650 = ED0F 0
1660 = A126 B
1670 = CFB4 9
1680 = D942 F
1690 = 38CB F
1700 =  82C C
1710 = C934 5
1720 = 619B 1
1730 = C42E 6
1740 = 49BD 6
1750 = 8612 0
1760 = 8055 7
1770 = C1DE 0
1780 = ED0F F
1790 = CFA9 7
1800 = 38CB 9
1810 = B3A6 0
1820 = 55FB 8
1830 = 619B 8
1840 = ED0F 4
1850 = CA60 C
1860 = FBCC 2
1870 = AA9C 8
1880 =  C99 1
1890 = 671D 5
1900 = DC9E 9
1910 = 71BA 5
1920 = 289A 3
1930 = 619B 7
1940 = CEDB C
1950 = 6FB6 E
1960 = 5489 F
1970 = A273 2
1980 = 9766 A
1990 = 517E 0
2000 = B7AB 1
2010 = 20F9 3
2020 = 5E5E 7
2030 = 2C83 2
2040 = 289A 7
2050 = ED0F 5
2060 = A255 C
2070 =  379 D
2080 = FF96 5
2090 = EF1F 5
2100 = D61E 8
2110 = C25C 1
2120 = E2E4 D
2130 = 2C83 7
2140 = ED0F B
2150 = 7AAB 9
2160 = F362 7
2170 = 762D 5
2180 = B760 4
2190 = B877 B
2200 =  B28 7
2210 = 1DF4 9
2220 = B760 4
2230 = 2C83 1
2240 = 2C83 9
2250 = ED0F C
2260 = 1FCD 1
2270 = 7A16 B
2280 = 718A D
2290 = BB04 5
2300 = AF8E 7
2310 = A2FC 5
2320 = 9ACF D
2330 =  3CA 1
2340 = 53B6 4
2350 = D206 3
2360 = 5096 4
2370 = 7369 F
2380 = 2448 2
2390 = 4939 5
2400 =  4F9 C
2410 = 9BBB 6
2420 = 2C83 6
2430 = B81B 1
2440 = 7A89 5
2450 = FF3E C
2460 = DB82 B
2470 = E8D6 C
2480 = FF3E 8
2490 = 6270 3
2500 = 35EC 2
2510 = 5E85 1
2520 = 53B6 7
2530 = 23FF 9
2540 = BD39 7
2550 = 4939 4
2560 =  4F9 F
2570 = 9BBB D
2580 = 2C83 D
2590 = 74D9 B
2600 = B760 5
2610 = 2C83 C
2620 = 2C83 C
2630 =  F60 9
2640 = ED0F 8
2650 = EAAB 7
2660 = 7A16 B
2670 = 52DD 3
2680 = 8893 7
2690 = D8F6 9
2700 = 2BD8 5
2710 = E398 7
2720 = 9E05 0
2730 = 5E85 1
2740 = 9766 8
2750 = BFBA 3
2760 = 7A16 B
2770 = EF04 6
2780 = 6D7A 1
2790 = B760 9
2800 = 7A09 8
2810 = 8C02 1
2820 = B760 6
2830 = 2C83 F
2840 =  B48 E
2850 = B6F0 7
2860 = 9B4D 3
2870 = 9EBB 9
2880 = DBEE 1
2890 = ED0F 9
2900 = 1C42 4
2910 = 2731 5
2920 = FC3B C
2930 = AF09 2
2940 = 33A9 8
2950 = ED0F D
2960 = 42CF C
2970 = 6A05 2
2980 = 9F2E B
2990 = 7BFF F
3000 = 33A9 F
3010 = F4C9 0
3020 = 1400 5
3030 = ED0F 0
3040 = 8FD9 3
3050 = 173E 9
3060 = E9C4 4
3070 = 7E36 9
3080 = 72D7 A
3090 = 7A16 5
3100 = 5AB0 D
3110 = C32C B
3120 = 4463 B
3130 = ED0F B
3140 = EF59 9
3150 = AB18 7
3160 = AAF8 5
3170 = 17A4 D
3180 = ED0F 9
3190 = B42A 9
3200 = BFBA 3
3210 = E822 E
3220 = E3EF 4
3230 = A4A9 E
3240 = ED0F E
3250 = 8305 9
3260 = 7A16 0
3270 = D0BC E
3280 = 2D5E 6
3290 = FF3E 3
3300 = FF3E 8
3310 = AA07 C
3320 = 7CC5 A
3330 = 5F95 B
3340 = 68B4 6
3350 = FDA0 8
3360 = FE98 F
3370 = B6B6 7
3380 = FF3E B
3390 = 574C 0
3400 = ED0F B
```

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```
   10 REM Caption
   20 REM by John Dewar
   30 REM (c) The Micro User
   40 MODE4:PROCzero
   50 ON ERROR PROChelp
   60 PROCtitle
   70 REPEAT:RESTORE1230:*FX4,1
   80 PROCmenu(6)
   90 IFC=1PROCload
  100 IFC=2PROCguide
  110 IFC=3AND NC>0PROCrun
  120 IFC=4AND NC>0PROCsave
  130 IFC=5PROCoscli
  140 IFC=6AND NC>0PROCm("QUIT"+YN$):IFF
Nyn=ASC"N":C=0
  150 UNTILC=6:*FX4,0
  160 CLS:PROCon:END
  170 :
  180 DEFPROCadd:IFNC>MC:PROCfault("NO R
OOM!"):ENDPROC
  190 REPEAT:IFNC>0:FORJ=0TOML:C$(NC,J)=
C$(NC-1,J)
  200 IFNC>0:P=NC*ML+J+NC:K=P-ML-1:P?LD=
K?LD:NEXT
  210 PROCunit(NC):PROCchange(NC):NC=NC-
(J<=ML):UNTILG=3 OR NC>MC:ENDPROC
  220 :
  230 DEFPROCbgrd(A$,X,Y):G=LENA$*40+16:
GCOL0,129:K=Y-40:IFDBL:K=Y-72
  240 VDU24,X-24;K-4;X+G;Y+16;16,24,0;0;
1279;1023;:GCOL0,128:GCOL0,0
  250 MOVEX-16,Y+12:DRAWX+G-8,Y+12:DRAWX
+G-8,K:DRAWX-16,K:DRAWX-16,Y+12:ENDPROC
  260 :
  270 DEFPROCchange(N):REPEAT:X=0:Y=0:G=
0:REPEAT:A$=C$(N,Y):B$=A$
  280 IFG=0:PROCm("USE: SHIFT,ARROWS,CTR
L,COPY OR RETURN")
  290 REPEAT:COLOUR129:COLOUR0:PRINTTAB(
5,4+Y*2)A$;:COLOUR128:COLOUR1
  300 IFX>LENA$:X=LENA$ ELSE IFX<0:X=0
  310 IFLENA$<30:PRINTSPC(30-LENA$);
  320 VDU31,X+5,4+Y*2:PROCon:G=GET:*FX21
,0
  330 IFG>31AND G<127:A$=LEFT$(LEFT$(A$,
X)+CHR$G+MID$(A$,X+1),30):X=X+1
  340 IFG=127AND X>0:A$=LEFT$(A$,X-1)+MI
D$(A$,X+1):X=X-1
  350 IFG=136AND INKEY-2:A$=MID$(A$,X+1)
:X=0
  360 IFG=136:X=X-1:IFINKEY-1:X=X-4
  370 IFG=137AND INKEY-2:A$=LEFT$(A$,X)
  380 IFG=137:X=X+1:IFINKEY-1:X=X+4
  390 PROCoff:IFINKEY-106:A$=B$:X=0
  400 UNTILG=13 OR G=138 OR G=139:C$(N,Y
)=A$:IFINKEY-2:PROCctrl
  410 IFG=138:Y=Y-(Y<ML)ELSE IFG=139:Y=Y
+(Y>0)ELSE IFG=13:X=0:Y=Y+1
  420 UNTILY>ML:PROCm("What next?  1-Mod
ify  2-Next  3-Exit")
  430 REPEAT:G=GET-48:UNTILG>0AND G<4:UN
TILG>1
  440 PROCw:J=0:FORL=0TOML:B$=C$(N,L):PR
OCxtra:J=J-(B$=""):NEXT:ENDPROC
  450 :
  460 DEFPROCcol:PROCact:PROCm("")
  470 DBL=TRUE:PROCnorm("SPACE to change
 colour",8)
  480 DBL=TRUE:PROCedge("R to restore co
lour",13):BOX=TRUE
  490 PROCnorm("RETURN for menu",19):PRO
Coff:REPEAT:G=GET AND&DF:*FX21,0
  500 IFG=0:AW=AW MOD7+1:PROCact ELSE IF
G=ASC"R":PROClog
  510 UNTILG=13:PROClog:ENDPROC
  520 :
  530 DEFPROCctrl:IFY=ML:C$(N,ML)=MT$:X=
0:G=0:ENDPROC
  540 IFG=138:FORL=ML TOY+1STEP-1:C$(N,L
)=C$(N,L-1):P=N*ML+L+N:J=P-1
  550 IFG=138:P?LD=(J?LD)+2:NEXT:P=N*ML+
Y+N:P?LD=(P?LD)MOD32:C$(N,Y)=MT$
  560 K=2:P=N*ML+Y+N:IF(P?LD)MOD64>31:K=
3
  570 IFG=139:FORL=Y TOML-1:C$(N,L)=C$(N
,L+1):P=N*ML+L+N:J=P+1
  580 IFG=139:P?LD=(J?LD)-K:NEXT:K=(P?LD
)MOD32+2:IF(P?LD)MOD64>31:K=K+1
  590 IFG=139:P=N*ML+ML+N:P?LD=K:C$(N,ML
)=MT$
  600 PROCunit(N):X=0:G=0:ENDPROC
  610 :
  620 DEFPROCdelay:PRINTTAB(0,1)"Delay="
;Del;:IFDel=0:PRINT" (Manual)"
  630 PROCm("RETURN for manual control")
  640 PRINTTAB(0,3)"Enter delay in secs:
 ";:Del=VAL(FNin(3)):ENDPROC
  650 :
  660 DEFPROCdown(N):IFJ<=ML:ENDPROC
  670 FORJ=N TOMC-1:FORK=0TOML:P=J*ML+K+
J:L=P+ML+1
  680 C$(J,K)=C$(J+1,K):P?LD=L?LD:NEXT:N
EXT:NC=NC-1
  690 FORJ=0TOML:C$(MC,J)=MT$:P=MC*ML+J+
MC:P?LD=J*2+2:NEXT:ENDPROC
  700 :
  710 DEFPROCedge(A$,Y):VDU5:GCOL0,1:Y=(
32-Y)*32-4:X=FNx(A$)
  720 IFBOX:PROCbgrd(A$,X,Y)
  730 FORJ=1TOLENA$:B$=MID$(A$,J,1):GCOL
0,1:IFBOX:GCOL0,0
  740 IFB$>CHR$32:IFDBL:?&71=ASCB$:CALL
CODE:B$=EVAL(C$)
  750 IFB$>CHR$32:MOVEX-4,Y+4:PRINTB$:MO
VEX-4,Y:PRINTB$:MOVEX-4,Y-4
  760 IFB$>CHR$32:PRINTB$:MOVEX,Y+4:PRIN
TB$:MOVEX,Y-4:PRINTB$:MOVEX+4,Y+4
  770 IFB$>CHR$32:PRINTB$:MOVEX+4,Y:PRIN
TB$:MOVEX+4,Y-4:PRINTB$
  780 GCOL0,0:IFBOX:GCOL0,1
  790 IFB$>CHR$32:MOVEX,Y:PRINTB$
  800 X=X+40:NEXT:BOX=FALSE:DBL=FALSE:EN
DPROC
  810 :
  820 DEFPROCflip:P=N*ML+M+N:K=-1:IF(P?L
D)MOD64>31:K=1
  830 IFM<ML:FORJ=M+1TOML:P=N*ML+J+N:P?L
D=(P?LD)+K:NEXT
  840 P=N*ML+ML+N:IF(P?LD)MOD32+2<31:END
PROC
  850 REPEAT:FORJ=0TOML:K=N*ML+J+N:K?LD=
(K?LD)-1:NEXT
  860 UNTIL(K?LD)MOD32+2<31:ENDPROC
  870 :
  880 DEFPROCguide:REPEAT:RESTORE1240:*F
X4,1
  890 PROCmenu(8):IFC>1AND C<8AND NC=0:P
ROCfault("NO CAPTIONS"):C=0
  900 IFC=1PROCadd ELSE IFC=2PROCwipe EL
SE IFC=3PROCinsert ELSE IFC=4PROCyn
  910 IFC=5PROCplace ELSE IFC=6PROCcol E
LSE IFC=7PROCdelay
  920 UNTILC=8:ENDPROC
  930 :
  940 DEFPROChelp:CLOSE#0:COLOUR128:COLO
UR1:PROClog:CLS:IFERR=17:ENDPROC
  950 REPORT:PRINT" at line ";ERL:VDU7:G
=GET:ENDPROC
  960 :
  970 DEFPROCinsert:IFNC>MC:PROCfault("N
O ROOM!"):ENDPROC
  980 REPEAT:CLS:PROCm("Insert before 1-
"+STR$(NC)+"? ")
  990 N=VAL(FNin(2))-1:IFN>=NC:N=-1
 1000 IFN>=0:PROCup(N):PROCunit(N):PROCc
hange(N):PROCdown(N):N=G
 1010 UNTILN<0 OR N=3 OR NC>MC:ENDPROC
 1020 :
 1030 DEFPROCjump:REPEAT:PRINTTAB(2,Y)SP
C36;TAB(2,Y)"Caption ";N+1;
 1040 PRINT" of ";NC;", jump to? ";:G=VA
L(FNin(2))-1:UNTILG>=0AND G<NC
 1050 N=G:G=0:ENDPROC
 1060 :
 1070 DEFPROCload:VDU14:A%=0:Y%=0:M=USR(
&FFDA)AND&F:IFM>3:*CAT
 1080 IFNC>0:PRINT:PRINT"LOAD";YN$;:IFFN
yn=ASC"N":ENDPROC
 1090 PRINT':PRINT"Load which file? ";:*
FX4,0
 1100 A$=FNin(12):N=OPENIN(A$):IFM>3AND
N=0:PROCfault("NOT FOUND"):ENDPROC
 1110 PRINT':PRINT"Loading":PRINT:INPUT#
N,AW,Cen,Del,Glo,Hid,NC,Str
 1120 FORJ=0TONC-1:VDU46:FORK=0TOML:INPU
T#N,C$(J,K),L
 1130 P=J*ML+K+J:P?LD=L:NEXT:NEXT:CLOSE#
N:ENDPROC
 1140 :
 1150 DEFPROCm(A$):PROCline(28):PRINTTAB
(0,25)SPC119;
 1160 PRINTTAB((40-LENA$)DIV2,25)A$;:END
PROC
 1170 :
 1180 DEFPROCmenu(N):VDU12:PRINTTAB(17,2
)"OPTION":PROCline(8)
 1190 FORJ=1TON:READA$:PRINTTAB(15,3+J*2
);J;RIGHT$(STRING$(6,CHR$46)+A$,9)
 1200 NEXT:PROCline(VPOS+5):PRINTTAB(15,
VPOS+2)"CHOOSE 1-";N
 1210 PROCnorm("("+STR$(NC)+" CAPTIONS)"
,VPOS+6):PROCoff
 1220 REPEAT:C=GET-48:UNTILC>0AND C<=N:C
LS:ENDPROC
 1230 DATAload,editor,display,save,*comm
and,QUIT
 1240 DATAadd,delete,insert,edit,positio
n,colour,delay,EXIT
 1250 :
 1260 DEFPROCnorm(A$,Y):VDU5:GCOL0,1:Y=(
32-Y)*32-4:X=FNx(A$)
 1270 IFBOX:PROCbgrd(A$,X,Y)
 1280 FORJ=1TOLENA$:B$=MID$(A$,J,1)
 1290 IFB$>CHR$32AND DBL:?&71=ASCB$:CALL
 CODE:B$=EVAL(C$)
 1300 IFB$>CHR$32:MOVEX,Y:PRINTB$
 1310 X=X+40:NEXT:BOX=FALSE:DBL=FALSE:EN
DPROC
 1320 :
 1330 DEFPROCoscli:PRINT:PRINT"Enter *co
mmand":PROCon:INPUT TAB(0,3)A$
 1340 VDU14:PRINT:G=&900:$G=A$:X%=G MOD2
56:Y%=G DIV256:CALL &FFF7
 1350 PRINT:PRINT"SPACE to continue...";
:REPEAT UNTILGET=32:ENDPROC
 1360 :
 1370 DEFPROCplace:M=0:N=0:PROCact:REPEA
T:PROCview(N):Y=N*ML+ML+N:IFGlo:Y=ML
 1380 Y=(Y?LD)MOD32+3:PRINTTAB(2,Y)"b,d,
e,C,G,H,S,j,UP,DOWN,SHIFT,RETURN";
 1390 REPEAT:P=N*ML+M+N:IFGlo:P=M
 1400 PROCon:VDU31,0,(P?LD)MOD32:G=GET A
ND&DF
 1410 IFG=138:K=N*ML+ML+N:K=(K?LD)MOD32+
2:IFM<ML AND NOT INKEY-1:M=M+1
 1420 IFG=138AND INKEY-1AND K<30:FORJ=0T
OML:P=N*ML+J+N:P?LD=(P?LD)+1:NEXT:Y=Y+1
 1430 IFG=138AND INKEY-1AND K<30:VDU30,1
1
 1440 IFG=139:K=N*ML+N:K=(K?LD)MOD32:IFM
>0AND NOT INKEY-1:M=M-1
 1450 IFG=139AND INKEY-1AND K>1:FORJ=0TO
```

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```
ML:P=N*ML+J+N:P?LD=(P?LD)-1:NEXT:Y=Y-1
 1460 IFG=139AND INKEY-1AND K>1:VDU31,0,
31,10
 1470 UNTILINSTR("BCDEGHJS"+CHR$13,CHR$G
):IFG=ASC"B":P?LD=(P?LD)EOR64
 1480 IFG=ASC"C":Cen=NOT Cen ELSE IFG=AS
C"D":P?LD=(P?LD)EOR32:PROCflip
 1490 IFG=ASC"E":P?LD=(P?LD)EOR128 ELSE
IFG=ASC"G":Glo=NOT Glo
 1500 IFG=ASC"H":Hid=NOT Hid ELSE IFG=AS
C"J":PROCjump
 1510 IFG=ASC"S":Str=NOT Str
 1520 UNTILG=13:C=0:PROCtitle:ENDPROC
 1530 :
 1540 DEFPROCrun:REPEAT:CLS:PRINT:PRINT"
Stop at caption 1-";NC;"? ";
 1550 M=VAL(FNin(2))-1:UNTILM>=0ANDM<NC
 1560 VDU26:CLS:REPEAT:G=INKEY(100):SOUN
D1,G*15,149,2:UNTILG>0
 1570 FORN=0TOM:PROCview(N):*FX21,0
 1580 IFDel<1:REPEAT:G=INKEY(100):SOUND1
,G*15,149,2:UNTILG>0:CLS
 1590 IFDel>0:TIME=0:REPEATUNTILTIME>=De
l*100:CLS
 1600 NEXT:REPEAT:G=INKEY(100):SOUND1,G*
15,149,2:UNTILG>0:PROCtitle:ENDPROC
 1610 :
 1620 DEFPROCsave:VDU14:A%=0:Y%=0:M=USR(
&FFDA)AND&F:IFM>3:*CAT
 1630 PRINT:PRINT"Enter filename - ";:*F
X4,0
 1640 A$=FNin(12):N=0:IFM>3:N=OPENIN(A$)
:CLOSE#N
 1650 IFN>0:PRINT':PRINT"Exists, overwri
te";YN$;:IFFNyn=ASC"N":ENDPROC
 1660 PRINT'':PRINT"Saving":PRINT:N=OPEN
OUT(A$)
 1670 PRINT#N,AW,Cen,Del,Glo,Hid,NC,Str
 1680 FORJ=0TONC-1:VDU46:FORK=0TOML:PRIN
T#N,C$(J,K):P=J*ML+K+J
 1690 PRINT#N,P?LD:NEXT:NEXT:IFM>3:PTR#N
=&1A2E
 1700 CLOSE#N:ENDPROC
 1710 :
 1720 DEFPROCtitle:VDU26:CLS:PROClog:BOX
=TRUE:CTR=TRUE:DBL=TRUE
 1730 PROCnorm("CAPTION by John Dewar",1
):PROCoff:VDU28,0,31,39,4:ENDPROC
 1740 :
 1750 DEFPROCunit(N):CLS:PROCnorm("CAPTI
ON "+STR$(N+1)+"/"+STR$(NC),5):PROCoff
 1760 FORJ=0TOML:PRINTTAB(5,3+J*2)STRING
$(30,CHR$95)
 1770 PRINTTAB(3,4+J*2);J+1;SPC1;:COLOUR
129:COLOUR0
 1780 PRINTC$(N,J):COLOUR128:COLOUR1:NEX
T:PROCm(""):ENDPROC
 1790 :
```

**Checksums:** *Use the new checksum generator – from the February 1989 issue of* The Micro User – to check the accuracy of your typing when keying in this listing.

```
 1800 DEFPROCup(N):PROCw:FORJ=MC TON+1ST
EP-1:FORK=0TOML:P=J*ML+K+J
 1810 L=P-ML-1:C$(J,K)=C$(J-1,K):P?LD=L?
LD:NEXT:NEXT:NC=NC+1:ENDPROC
 1820 :
 1830 DEFPROCview(N):VDU26:CLS:PROCact:C
TR=Cen:IFHid:VDU19,1,0;0;
 1840 FORL=0TOML:B$=C$(N,L):P=N*ML+L+N:I
FGlo:P=L
 1850 J=(P?LD)MOD32:IFStr:PROCxtra
 1860 DBL=FALSE:IF(P?LD)MOD64>31:DBL=TRU
E
 1870 BOX=FALSE:IF(P?LD)MOD128>63:BOX=TR
UE
 1880 IF(P?LD)DIV128=0AND B$<>"":PROCnor
m(B$,J)
 1890 IF(P?LD)DIV128=1AND B$<>"":PROCedg
e(B$,J)
 1900 NEXT:PROCact:PROCoff:ENDPROC
 1910 :
 1920 DEFPROCwipe:N=0:REPEAT:PROCunit(N)
:PROCm("DELETE"+YN$):*FX21,0
 1930 IFFNyn=ASC"Y":PROCw:PROCdown(N):N=
N-1
 1940 N=N+1:UNTILN=NC:ENDPROC
 1950 :
 1960 DEFPROCxtra:B$=CHR$32+B$+CHR$32
 1970 REPEAT:B$=MID$(B$,2):UNTILASCB$<>3
2 OR B$="":IFB$="":ENDPROC
 1980 REPEAT:B$=LEFT$(B$,LENB$-1):UNTILR
IGHT$(B$,1)<>CHR$32 OR B$="":ENDPROC
 1990 :
 2000 DEFPROCyn:N=0:REPEAT:PROCunit(N):P
ROCm("EDIT"+YN$):*FX21,0
 2010 IFFNyn=ASC"Y":PROCchange(N):IFJ=ML
+1:PROCdown(N):N=N-1
 2020 N=N+1:UNTILN>=NC OR G=3:ENDPROC
 2030 :
 2040 DEFPROCzero:MC=19:ML=8:DIM C$(MC,M
L),CODE 49,LD (MC+1)*(ML+1)
 2050 NC=0:AW=7:Cen=TRUE:Del=30:Glo=FALS
E:Hid=FALSE:Str=TRUE:PROCw
 2060 MT$=STRING$(30,CHR$32):C$="CHR$224
+CHR$10+CHR$8+CHR$225+CHR$11"
 2070 FORJ=0TOMC:FORK=0TOML:C$(J,K)=MT$:
P=J*ML+K+J:P?LD=K*2+2:NEXT:NEXT
 2080 A$=MT$:B$=MT$:YN$=" (Y/N)? "
 2090 RESTORE2100:FORJ=0TO49:READA$:J?CO
DE=EVAL("&"+A$):NEXT:ENDPROC
 2100 DATA A9,E0,85,70,A9,0A,A2,71,A0,00
,20,F1,FF,A0,00,A9,17,20
 2110 DATA EE,FF,A5,70,20,EE,FF,A2,00,C8
,B9,71,00,20,EE,FF,20,EE
 2120 DATA FF,E8,E8,E0,08,D0,F0,E6,70,C0
,08,D0,DE,60
 2130 :
 2140 DEFPROCact:VDU19,1,AW;0;:ENDPROC
 2150 DEFPROClog:VDU19,1,7;0;:ENDPROC
 2160 DEFPROCfault(A$):PROCm(A$):VDU7:G=
GET:ENDPROC
 2170 DEFPROCline(Y):GCOL0,1:Y=(32-Y)*32
-4:MOVE0,Y:DRAW1279,Y:ENDPROC
 2180 DEFPROCoff:VDU4,23,1,0;0;0;0;:ENDP
ROC
 2190 DEFPROCon:VDU23,0,10,96,0;0;0;:END
PROC
 2200 DEFPROCw:PROCm("Please wait"):ENDP
ROC
 2210 :
 2220 DEFFNin(K):PROCon:A$="":REPEAT:G=G
ET
 2230 IFG>31AND G<127AND LENA$<K:A$=A$+C
HR$G:VDUG
 2240 IFG=127AND LENA$>0:A$=LEFT$(A$,LEN
A$-1):VDUG
 2250 UNTILG=13:PROCoff:=A$
 2260 :
 2270 DEFFNx(A$):IFCTR:=(1280-LENA$*40)D
IV2 ELSE=32
 2280 DEFFNyn:REPEAT:G=GET AND&DF:UNTILI
NSTR("YN",CHR$G):VDUG:=G
```

Get it right!

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 45B1 1
  50 = 4F51 A
  60 = 5255 5
  70 = E57C 4
  80 = 9A79 1
  90 = DF64 E
 100 = 8C41 4
 110 = FC16 6
 120 = 6F16 B
 130 = 3F55 0
 140 = 7B34 B
 150 = EF2A 6
 160 = C23C B
 170 = 9719 B
 180 = A808 4
 190 = 30D1 F
 200 = 3353 C
 210 = 13B3 0
 220 = 9719 F
 230 = B90B 5
 240 = 151E 9
 250 = E608 2
 260 = 9719 C
 270 = C4C3 C
 280 = 4BE2 B
 290 = 9555 C
 300 = 4EBA C
 310 = 806D E
 320 = EBA4 7
 330 = 7E18 2
 340 = A378 F
 350 = 3747 9
 360 = D528 7
 370 = 2AF4 B
 380 =   D4 C
 390 = 34A3 F
 400 = 79D3 F
 410 = B539 8
 420 = D58F C
 430 = C495 3
 440 = 66A1 B
 450 = 9719 C
 460 = 7C25 6
 470 = C013 8
 480 = 7A8B 8
 490 = 7192 E
 500 = BAB4 0
 510 = 5406 1
 520 = 9719 A
 530 = C62D F
 540 = CFB6 9
 550 = 4FCF 0
 560 =  A78 3
 570 = 5441 C
 580 = AA1A B
 590 = 1A7C 4
 600 = 2C4D C
 610 = 9719 5
 620 = 2649 E
 630 = 3CAA B
 640 = D5C1 2
 650 = 9719 9
 660 =  8A5 4
 670 = 704C 6
 680 = 9192 2
 690 = 169F F
 700 = 9719 5
 710 = A9E9 B
 720 = 4BA6 C
 730 = F5A9 7
 740 = F0BE C
 750 = 1007 2
 760 = D994 E
 770 = BF8A 3
 780 = 8382 D
 790 = 1F92 8
 800 = 8C00 3
 810 = 9719 7
 820 = 4476 C
 830 = EDAA 3
 840 = E755 D
 850 = DDDF 1
 860 = 5230 8
 870 = 9719 9
 880 =  881 7
 890 = 210D A
 900 = A070 2
 910 = 8240 3
 920 = 5E7F 8
 930 = 9719 3
 940 = A1B5 D
 950 = 7A71 3
 960 = 9719 1
 970 = DDE3 6
 980 = 111A A
 990 = EEE1 C
1000 = 2270 7
1010 = 5986 B
1020 = 9719 6
1030 = 38A0 B
1040 = E033 B
1050 = F017 0
1060 = 9719 A
1070 = 3CB5 D
1080 = 1F3F A
1090 = 6905 8
1100 = A1E8 D
1110 = 28D6 1
1120 = 8908 D
1130 = 7986 7
1140 = 9719 F
1150 = 1EF7 8
1160 =  3A7 0
1170 = 9719 7
1180 = A27B 1
1190 = 661E 0
1200 =  FE1 6
1210 =   89 7
1220 = 9DE4 0
1230 = C2CB A
1240 =  D8F 4
1250 = 9719 1
1260 = 6398 2
1270 = 4BA6 9
1280 = 535D 3
1290 = 777D 2
1300 = 1F92 0
1310 = 8C00 F
1320 = 9719 5
1330 = 47FD C
1340 = BF4F 4
1350 =  D43 6
1360 = 9719 6
1370 = DCD9 0
1380 = 5F90 F
1390 = 5577 1
1400 = 3765 3
1410 = ECE2 5
1420 = BD6B 0
1430 = 497F D
1440 = C33E F
1450 = 2620 8
1460 = AF28 F
1470 = 7900 9
1480 = 2EA3 7
1490 = CDE3 9
1500 = 5BCF E
1510 = 6927 D
1520 = 72E2 D
1530 = 9719 5
1540 = 44FD 2
1550 = E5F7 7
1560 = 3ED3 0
1570 = 3C8C C
1580 = 1EDF F
1590 = 5251 F
1600 = 9A9E D
1610 = 9719 7
1620 =  7B0 3
1630 = A04B 2
1640 = 6914 E
1650 = 6EC2 9
1660 = 486C 2
1670 = 4BD1 0
1680 = 2302 3
1690 =  A79 F
1700 = 32F1 5
1710 = 9719 5
1720 = 9B44 A
1730 = 27BF 4
1740 = 9719 9
1750 = F617 D
1760 = 1D17 6
1770 = 62E1 3
1780 =  3DE C
1790 = 9719 2
1800 = 86CE 0
1810 = 226A 8
1820 = 9719 2
1830 = 269F D
1840 = 8F55 1
1850 = D067 4
1860 = B41F 7
1870 =  4B3 4
1880 = 13D8 A
1890 = DFB6 A
1900 = 8D2C B
1910 = 9719 E
1920 = FD93 E
1930 = 7466 4
1940 =  260 2
1950 = 9719 E
1960 = 8F28 3
1970 = 8044 0
1980 = 1148 2
1990 = 9719 A
2000 = 53BB 0
2010 = 4A2B B
2020 = F3F2 6
2030 = 9719 4
2040 = ED18 9
2050 = 4241 1
2060 = 4E8C E
2070 = 90BA 6
2080 = A3DA 8
2090 = A53D E
2100 = 3128 6
2110 = AFBB 3
2120 = 2630 2
2130 = 9719 7
2140 = 887B 7
2150 = C8A8 8
2160 = C948 B
2170 =  AD6 3
2180 = 9603 B
2190 = 5D23 B
2200 = 7BB7 C
2210 = 9719 4
2220 = 33A8 D
2230 = 4055 D
2240 = 541F 6
2250 = D262 F
2260 = 9719 0
2270 = 1654 4
2280 = 4F2F 7
```

## Computers and Upgrades

| | |
|---|---|
| Archimedes 305 | £669.00 (a) |
| Archimedes 305 Mono System | £759.00 (a) |
| Archimedes 305 Colour System | £919.00 (a) |
| Archimedes 310 | £835.00 (a) |
| Archimedes 310 Mono System | £895.00 (a) |
| Archimedes 310 Colour System | £1055.00 (a) |
| Archimedes 310M | £895.00 (a) |
| Archimedes 310M Mono System | £955.00 (a) |
| Archimedes 310M Colour System | £1115.00 (a) |
| Archimedes 440 | £2529.00 (a) |
| Archimedes 440 Mono System | £2589.00 (a) |
| Archimedes 440 Colour System | £2749.00 (a) |

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|---|---|
| Archimedes podule backplane | £39.00 (d) |
| Archimedes ROM podule | £59.00 (d) |
| Archimedes I/O podule | £85.00 (d) |
| Archimedes Midi add-on to I/O podule | £39.00 (e) |
| Archimedes Midi podule | £69.00 (d) |
| Master 128 | £369.00 (a) |
| Master Compact | From £310.00 (a) |
| Master Turbo Upgrade | £110.00 (c) |
| Master 128 Eprom Cartridge | £11.00 (c) |
| Master 128 Dust Cover | £4.50 (e) |
| Compact RS 232 Interface | £26.00 (c) |
| Compact TV Modulator | £26.00 (e) |
| 1770 Disc Interface | £45.00 (d) |
| ADFS ROM (B+ or B with 1770) | £25.00 (e) |
| B+64 64K Upgrade | £30.00 (d) |
| Trade in your old Model B against a new Master 128, Master Compact or Archimedes | |
| Cambridge Computers Z88 | £244.00 (a) |
| Z88 PSU | £8.65 (d) |
| 128K RAM | £43.00 (e) |
| 128K Eprom | £43.00 (e) |

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## Printers (Dot Matrix)

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|---|---|
| Citizen 120D 80col/120cps + 25cps NLQ | £130.00 (a) |
| Citizen MSP15E 136col/160cps + 40cps NLQ | £230.00 (a) |
| Citizen MSP40 80col/200cps + 50cps NLQ | £300.00 (a) |
| Citizen MSP45 136col/200cps + 50cps NLQ | £390.00 (a) |
| Citizen MSP50 80col/250cps + 60cps NLQ | £390.00 (a) |
| Citizen MSP55 136col/250cps + 60cps NLQ | £515.00 (a) |
| Citizen HQP40 24pin 80col/200cps + 60cps LQ | £369.00 (a) |
| **Citizen HQP45 24pin 136col/200cps + 60cps LQ Special** | **£350.00 (a)** |
| Star LC10 120cps + 30cps NLQ | £199.00 (a) |
| Star ND10 80col/180cps + 45cps NLQ | £320.00 (a) |
| Star ND15 136col/180cps + 45cps NLQ | £380.00 (a) |
| Star NR10 80col/240cps + 60cps NLQ | £395.00 (a) |
| Star NR15 136col/240cps + 60cps NLQ | £460.00 (a) |
| Star LC24-10 80col/142cps + 47cps LQ 24pin | £305.00 (a) |

## Printers (Laser)

| | |
|---|---|
| Citizen Overture 110+ 10pages/min | £1390.00 (a) |
| Star Laser Printer 8 8 pages/min | £1700.00 (a) |

All laser printers with1 year on site maintenance

## AMX Mouse and Software

| | |
|---|---|
| AMX Mouse + Super Art | £60.00 (d) |
| AMX Pagemaker | £37.00 (d) |
| Extra Extra | £21.00 (e) |
| Mouse Mat | £4.34 (e) |

## Disc Drives

**Mitsubishi Drives**

| | |
|---|---|
| Single DS 40/80T | £96.00 (a) |
| Single DS 40/80T inc PSU | £111.00 (a) |
| Dual DS 40/80T | £189.00 (a) |
| Dual DS 40/80T inc PSU | £209.00 (a) |
| Dual DS 40/80T inc PSU & Plinth | £214.00 (a) |
| 20Mb Winchester | £449.00 (a) |
| Combination 3.5 5.25 Winchester available | Phone for details |

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|---|---|
| 3M744 SS/DD 48TPI | £8.00 (d) |
| 3M745 DS/DD 48TPI | £9.00 (d) |
| 3M747 DS/DD 96TPI | £13.00 (d) |
| Add £1 for plastic library case | |
| B & S Label 96TPI in see through LIB. Case DS/DD | £10.00 (d) |
| Disc Cleaning Kit (state 5.25" or 3.5") | £5.00 (d) |
| **3.5"** | |
| 3M 35SS SS/DD (Box of 10) | £13.00 (d) |
| 3M 35DS DS/DD (Box of 10) | £16.00 (d) |
| B & S Label DS/DD | £13.00 (d) |

**Lockable Anti-Static 5.25" Storage Cases**

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| 50 Disc Capacity | £8.00 (d) |
| 100 Disc Capacity | £10.00 (d) |

## Monitors

**All Monitors include BBC Lead**

| | |
|---|---|
| BM 7502 (Green) Hi-Res Mono Monitor with Audio | £69.00 (a) |
| Philips Colour Monitor RGB, Composite Video, Audio in Linear RGB Green Screen SwitchableBBC/IBM Compatible CM8833 | £220.00 (a) |
| Philips Multisync CM8873 CGA/EGA/PGA Compatible | £520.00 (a) |
| Ideal for use with Acorn Archimedes computers. | |
| **Microvitec** | |
| 1431 (Metal or Plastic Case please specify) Std. Res. | £184.00 (a) |
| 1451 (Metal or Plastic Case please specify) Med Res. | £229.00 (a) |
| 1441 (Metal or Plastic Case please specify) High Res. | £379.00 (a) |
| 1431 AP Metal Case RGB and CV/Audio Std. Res. | £209.00 (a) |
| 1451 AP Metal Case only RGB and CB Audio Med. Res. | £259.00 (a) |
| TILT and SWIVEL Stands for Plastic Case Only | £19.00 (a) |
| **Plinths** | |
| BBC B Single | £11.00 (c) |
| BBC Master Single | £12.00 (c) |
| BBC Master with Shelf | £22.00 (b) |

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## ROM Boards

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|---|---|
| ATPL Sideways Model B | £35.00 (d) |
| ATPL Sideways Model B+ | £31.00 (d) |
| Viglen Spare Cartridges | £2.50 (e) |

## Peartree Products

| | |
|---|---|
| MR5000 Master ROM Cartridge | £8.95 (e) |
| MR6000 Master ROM Cartridge | £11.95 (e) |
| MR7200 Master RAM Cartridge | £33.95 (e) |
| MR8000 Master RAM Cartridge | £49.95 (e) |
| MR3000 Mini ROM Board BBC B only | £15.95 (e) |
| MR4300 Mini ROM/RAM Board BBC B only | £39.95 (e) |
| MR4800 Mini RAM Board BBC B only | £89.95 (d) |

## Printer Ribbons and Accessories

| | |
|---|---|
| Epson LX 86 (Compat) | £2.50 (e) |
| Epson MX 80/RX 80/FX80/FX/85 (Compat) | £3.00 (e) |
| Juki 5510/Citizen MSP 20 (Compat) | £3.00 (e) |
| Citizen 120D/LSP10 | £3.75 (e) |
| Taxan 810/Canon (Compat) | £3.75 (e) |
| Juki 6100 Multistrike | £2.30 (e) |
| Tally MT85 Fabric | £5.00 (e) |
| Tally MT85 Carbon | £7.00 (e) |
| Printer lead 1.5m B/B+/M128/ELK +1 | £6.00 (e) |
| Printer lead 1.5m Compact | £8.00 (e) |
| Printer lead 1.8m IBM or Compatible + Archimedes | £10.00 (d) |
| 80col Printer Stand with Paper shelves | £29.00 (c) |
| Printer Switch Box 2 Way "T" Switch | £34.00 (c) |

## Modems

**All Modems inc BBC Lead**

| | |
|---|---|
| Miracle WS2000 | £95.00 (c) |
| Miracle WS4000 Hayes compatible | £144.00 (c) |
| Pace Nightingale + Commstar II | £94.00 (c) |
| Pace Commstar II ROM | £28.00 (e) |
| Pace Linnet | £124.00 (c) |
| Pace Series 4 2123S | £230.00 (a) |
| 50ft. Telephone Extn. Cable on Wind up Reel | £9.50 (d) |

## Software

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|---|---|---|---|
| **Acorn Soft** | | | |
| Micro Prolog | £50.00 (d) | ISO Pascal | £42.00 (d) |
| Logo | £44.00 (d) | BCPL | £39.00 (d) |
| View Printer Driver (D) | £8.00 (e) | Comal | £32.00 (d) |
| Lisp | £33.00 (e) | Hi View | £37.00 (d) |
| View Professional | £75.00 (c) | View 3.0 | £39.00 (d) |
| Viewsheet | £37.00(d) | View Store | £37.00 (d) |
| View Spell (80T only) | £29.00 (d) | View Plot | £21.00 (e) |
| View Index | £10.00 (e) | Overview | £69.00 (c) |
| Word Plus (Arch) | £75.00 (c) | Logistix (Arch) | £95.00 (d) |
| **Computer Concepts** | | | |
| Interword | £39.00 (d) | Inter Sheet | £39.00 (d) |
| Interchart | £26.00 (d) | Interbase | £49.00 (d) |
| Mega 3 | £75.00 (c) | Spellmaster | £42.00 (d) |
| Wordwise | £30.00 (c) | Wordwise + | £37.00 (d) |
| **All latest Archimedes Software (inc. Games) – Now in stock** | | | |
| **Mirrorsoft** | | | |
| Fleet Street Editor | £31.00 (d) | Fonts and Graphics | £11.75 (e) |
| **Clares** | | | |
| Fontwise + | £16.00 (e) | Replica III | £11.00 (e) |
| Artisian (Arch) | £31.00 (e) | Artisian Support | £16.00 (e) |
| VINE MICRO REPLAY (State M/C and Disc Interface) | | | £30.00 (e) |

**NB It is essential to state machine and 40/80T
when ordering software**

## Books (No VAT on Books)

| | | | |
|---|---|---|---|
| Master Ref. Manuals Pt1 | £14.00 (d) | Pt2 | £14.00 (d) |
| Advanced Master Ref. Manual (Bray & Dickens) | | | £19.95 (d) |

| | | | | | |
|---|---|---|---|---|---|
| Lisp | £8.00 (e) | Forth | £8.00 (e) | ISO Pascal | £8.00 (e) |
| BCPL | £14.00 (d) | View Guide | £6.00 (e) | Into View | £6.00 (e) |
| View 3 | £9.00 (e) | View Sheet | £9.00 (e) | View Store | £9.00 (e) |

| | |
|---|---|
| Archimedes Ref. Manual | £29.95 (d) |
| Arm Assembly Language Manual | £12.95 (e) |
| Mastering View, Viewsheet and Viewstore | £12.95 (e) |
| Understanding Interword | £6.50 (e) |
| View A Dabhand Guide | £12.95 (e) |
| Z88 Computing | £9.95 (e) |

## Fanfold Paper and Labels

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| 2000 x 1 Part 60gm 11 x 9.5" Micro Perf. | £12.00 (c) |
| 1000 x 1 Part 85gm 11 x 9.5" Micro Perf. | £9.00 (c) |
| 1000 x 1 Part 90gm "Perfect" A4 Micro Perf | £12.00 (b) |
| 1000 89mm x 36mm Labels | £4.00 (d) |
| 1000 89mm x 49mm Labels | £6.00 (d) |
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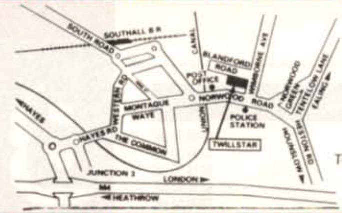

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| 305 & mono monitor | **665.00** |
| 305 & colour monitor | **827.00** |
| 310 BASE AKB15 | **731.00** |
| 310 & mono monitor | **783.00** |
| 310 & colour monitor | **922.00** |
| A310M AKB30 | **783.00** |
| A310M mono | **835.00** |
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| Podule Backplane | **35.00** |
| Archimedes Pref. Manual | **29.95** |
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| Eprom Cartridge | **13.00** |
| Reference Manual Part 1 | **14.95** |
| Reference Manual Part 2 | **14.95** |

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| | |
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| ***TV SYSTEM***<br>*128K* *Single 640K Drive* *UHF Modulator* *Bundled Software* | **319.00** |
| ***MONO SYSTEM***<br>*128K* *Single 640K Drive* *Bundled Software* *12" High Res Monochrome Monitor* | **349.00** |
| ***COLOUR SYSTEM***<br>*128K* *Single 640K Drive* *Bundled Software* *14" Medium Res Colour Monitor* | **481.00** |

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| **Samsung 12" Mono White** | **89.00** |
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| **Samsung 14" CGA/EGA** | **260.00** |
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| **Samsung 14" Multiscan** | **355.00** |

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| SD 802E Dual 400K Double Sided | **204.00** |
| SD 802D Dual 400K Drives horizontally mounted in a monitor stand to fit both the BBC B and the Master series | **230.00** |

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| | |
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| **MULTISYNC II**<br>14" MultiSync high resolution monitor offers automatic synchronisation, suitable for use with IBM/XT/AT and PS2 plus Apple Mac II and compatible with Hercules, MDA, CGA, EGA, EGA+, PGC, and VGA graphics standards. | **420.00** |
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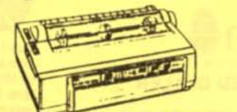

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**Panasonic KX-P1081.** ..... **135.00**

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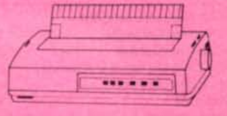

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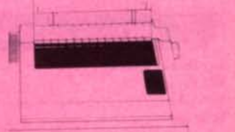

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# Piping PipeDream into Wordwise

*MOVING PipeDream spreadsheets from the Z88 into Wordwise – and perhaps even View or Mini Office II – is very easy if you go about it the right way.*

*From Wordwise menu mode enter the following commands:*

```
*FX7,7
*FX2,1
```

*to initialise the receive baud rate and enable the RS423. You'll now find that no key works except Break – don't press it – and Escape, which you should use to go into edit mode.*

*Moving to the Z88 disable the printer editor. Load your spreadsheet into Pipedream and press ◊PO and press Enter when the prompts appear. The document will now type itself into Wordwise in the same way as it would output to a printer.*

*Back to Wordwise: Press Break to re-enable the keyboard, adjust line length to correspond with Z88 and print out the text.* – **R.W. Newmark, Cleadon, Sunderland.**

## The slot for Z88 memory

*MY Z88 is equipped with 32k ram in addition to the 20k on the basic system. I transferred the Logger program to it from disc via a BBC Micro.*

*I then imported the file into Pipedream, removed all unwanted lines, inserted the normal #B, .J and NEW lines and saved the resulting code as a file, deleting the previous one in order not to waste space.*

*But when I attempted to import the program into Basic using the Filer's execute option it worked up to line 1200 after which the* No room *error was displayed after each new line.*

*No other files were present in the system at the time and nor were any other activities in a frozen state. I would be grateful if you could advise what I can do in order to get the program into the Z88 and running.* – **D.W.G. Harris, Wareham, Dorset.**

● We can only assume your 32k ram is in slot 2. If this is the case, Basic will only grab 8k rather than the 40k it would have access to if the cartridge were in slot 1.

Basic on the Z88 will always try to grab 40k if there is a ram expansion in slot 1 – this means that Basic will fail to initialise if you have a lot of suspended operations from other applications.

For people in this position with only short Basic programs to run it would be reasonable to put the ram in slot 2 so that Basic only tries to grab the smaller amount and is more likely to be successful.

## Bug-free roms found

*FURTHER to the letter in the February 1989 issue of* The Micro User *about the bugs in the Master 128 DFS, I've found two updated versions of the rom on the Welcome disc – the latest of which appears to be devoid of the errors.*

*I can see why most people don't realise they are there because I have only just come across it myself after owning the Master for quite some time. They are in the Library directory of the ADFS disc and can be loaded into sideways ram by the line:*

```
*SRLOAD name 8000 8 Q
*CONFIGURE FILE 9
```

*Then press Control+Break and name in this case is either DFS2,25 or DFS2,28.*

*Before switching off you need to reconfigure the File setting to nine. Otherwise switch on, and press Control+D+Break to get the old DFS.* – **J. Skilling, Quorn, Leics.**

## Win a tenner

● **Want to write to The Micro User? The address is: Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.**

**Writers of the most interesting letters receive a £10 prize.**

## Blotted copybook

*IN my copy of the March 1989 issue of* The Micro User *there is a printer's blot on page 117. This obscures some of the data in lines 710 and 720.Could you please give me the correct values?* – **Ivor Conroy, Rowlands Gill Tyne & Wear.**

● Unfortunately a small number of copies of the magazine were blotted in this way so here are the problem lines again:

```
710 DATA [_K{££BkA0a
0iF?az~rSt[?az~FhN
720 DATA GB\r?j?{FFc
IGPyBqOVNGkip^~|v^
```

## Minimal codes

*THERE are several ways of setting up your printer without leaving View or ViewSheet, but it is possible to do this from the command screen without having made any previous arrangements – such as using the machine code program explained in the January Letters.*

*Printer control sequences that do not include* Esc *can be sent directly from the keyboard. We are all used to sending Control+B to switch the printer on and Control+C to switch it off. An extension of this can be used to send useful control sequences. For example, to turn on compressed type use:*

```
Control+B
Control+A
Control+O
Control+C
```

*which is the equivalent of VDU2,1,15,3 from Basic.*

*You can't send the Esc code in this way – try Control+[ and see what happens – so it is necessary to resort to a ruse. This is to send the sequence involving the Esc code through a function key.*

*If Key 1 is programmed from the command screen by typing:*

```
*KEY1 |B|A|[|AW|A|A|C
```

*Pressing f1 will result in the codes 2,1,27,1,83,1,1,3 being sent to the printer – Enlarged type will have been switched on for an Epson-compatible machine.*

*However nothing will appear on the screen, so if you want confirmation of the action you can add a message to the key definition:*

```
*KEY1 |B|A|[|AW|A|A|C*||
Enlarged|M
```

*which will have the effect of passing the codes and then printing on the screen:*

```
*| Enlarged
```

*The bar character at the start of a line is the command line interpreters equivalent of REM.*

*Any codes can be sent in this way by setting up the function keys either from an exec file or at the instant you remember that you'd forgotten you wanted the ViewSheet printed out in compressed text.*

*The command line interpreter character conversion is quite complex. Putting | before a character reduces its Ascii value by 64, except that using | ! adds 128 to the next value and |? is 127 –*

Turn to Page 130 ▶

◀ **From Page 129**

*delete, here are some examples:*

<table>
<tr><th>Code</th><th>Value</th></tr>
<tr><td>|@</td><td>0</td></tr>
<tr><td>|A</td><td>1</td></tr>
<tr><td>|Z</td><td>26</td></tr>
<tr><td>|[</td><td>27 (Escape)</td></tr>
<tr><td>|?</td><td>127</td></tr>
<tr><td>|!|A</td><td>129</td></tr>
</table>

*As you will have noticed from the example and from your printer handbook, enlarged type is set up by W 1. Don't put a control symbol before the W or you will send Esc 23 1 and you won't get enlarged type.* – **Dr Peter C. Russell, Burnham Overy Staithe, Norfolk.**

## Fast binary conversion

*HERE's a couple of short routines to convert binary to decimal. The first is a considerable improvement on your March 1988 Leaky Listing:*

```
1000 DEFFNdec(b$)
1010 LOCAL D%,J%
1020 FORJ%=1TOLENb$
1030 D%=D%+D%+(ASCMID$(
b$,J%)AND1)
1040 NEXT:=D%
```

*Adding a variable to itself is the same as multiplying by two or shifting left in machine code terms.*

*For those who would prefer something a little more esoteric, here is a one line recursive version:*

```
1000DEFFNdec(b$,D%):IFb
$=""=D%ELSE=FNdec(MID$(b
$,2),D%+D%+(ASCb$AND1))
```

*The second parameter should always be 0 when it is called, for example:*

```
PRINT FNdec("10011011",0)
```

*MID$ without the third parameter gives the rest of the string. I hope these might be of some use.* – **Phil Bender, Sunderland.**

## Close, but not perfect

*I WOULD like to commend Kendall Down on a brilliant start to his series Wimps for the Archimedes. However I did find a bug or two in it: Line 1240 should have read:*

```
LEFT$(t$,INSTR(t$,"1")-1):t$
```

*and in line 1390:*

```
IFLEFT$(t$,1)="@"sha
```

*the @ should be *. After these changes I found the program worked correctly.* – **S. R. Mansfield, Margate, Kent.**

● Thanks for your observations on this and you are quite right about the faulty lines. These were not Kendall's fault, and appear to have crept in between the original copy and the final page.

**ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.**

**However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.**

**Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the letters pages.**

## Brighter Butterflies

*THE Butterfly program from your January issue certainly lived up to my hopes. However I did have to fiddle with it almost immediately, as when I first ran the program I could not understand why the screen printing came up with only the first colour I selected.*

*Was this a deliberate error to test my credentials I wondered or a genuine oversight? Looking at the listing I realised that although there was a reference to the choice of hindcolour at the design stage, it did not feature in the colour procedure. I therefore added these lines which make it run as it should:*

```
5511 IF HC$="R" C=1
5512 IF HC$="Y" C=2
5513 IF HC$="B" C=3
5514 GCOL 0,C
```

*That just about exhausted my programming skills, so I was all the more pleased when it worked. It is a very worthwhile program and I look forward to using it in the near future.* – **Hilary J. Lewis, Croydon, Surrey.**

## Midi possibility

*COULD you please let me know if there is a software package which would enable me to link a Midi keyboard to a BBC Micro?* – **S.P. Yeoman, Porthcawl, Wales.**

● Two companies we know of produce Midi software and hardware for the BBC Micro: Electromusic Research (0702 335747) and U-Music (01-788 3729). The relative merits of the two packages were compared in the January 1988 issue of *The Micro User*.

## Archimedes listing

*THE Multicolumn File Lister – published in* The Micro User, *November 1987 – is very useful but won't work properly with listings from the Archimedes because some tokens – SAVE and LIST are two examples – have been reassigned and many new ones have been added.*

*The additional tokens all require two bytes, the first of which is &C6, &C7 or &C8 and the second is always greater than &8E.*

*The modifications below detect such double tokens and direct the PROCtoken routine to additional data statements to determine the correct interpretation:*

*The existing data, in lines 1550-1620, have also been amended to reflect the changed allocations. Finally, line 830 required a change because the OTHERWISE keyword has the token &7F.* – **Peter Howard, Church Crookham, Hants.**

```
 830 IF byte%>=&7F PROCtoken
:REM OTHERWISE has token &7F
1002 IF byte%=&C6 RESTORE162
2:PROCtwobyte:PROCaddit:ENDP
ROC
1003 IF byte%=&C7 RESTORE162
3:PROCtwobyte:PROCaddit:ENDP
ROC
1004 IF byte%=&C8 RESTORE162
4:PROCtwobyte:PROCaddit:ENDP
ROC
1010 RESTORE 1550:I%=byte%-&
7F:ENDPROC
1550 DATA "OTHERWISE","AND","D
IV","EOR","MOD","OR","ERROR","
LINE","OFF","STEP","SPC","TAB(
","ELSE","THEN",<8D>,"OPENIN",
"PTR"
1560 DATA "PAGE","TIME","LOMEM
","HIMEM","ABS","ACS","ADVAL",
"ASC","ASN","ATN","BGET","COS"
,"COUNT","DEG","ERL","ERR"
1570 DATA "EVAL","EXP","EXT","
FALSE","FN","GET","INKEY","INS
TR(","INT","LEN","LN","LOG","N
OT","OPENUP","OPENOUT","PI"
1580 DATA "POINT(","POS","RAD"
,"RND","SGN","SIN","SQR","TAN"
,"TO","TRUE","USR","VAL","VPOS
","CHR$","GET$","INKEY$"
1590 DATA "LEFT$(","MID$(","RI
GHT$(","STR$","STRING$(","EOF"
,"AUTO","DELETE","LOAD","WHEN"
,"OF","ENDCASE","ELSE","ENDIF"
,"ENDWHILE","PTR"
1600 DATA "PAGE","TIME","LOMEM
","HIMEM","SOUND","BPUT","CALL
","CHAIN","CLEAR","CLOSE","CLG
","CLS","DATA","DEF","DIM","DR
AW"
1610 DATA "END","ENDPROC","ENV
ELOPE","FOR","GOSUB","GOTO","G
COL","IF","INPUT","LET","LOCAL
","MODE","MOVE","NEXT","ON","V
DU"
1620 DATA "PLOT","PRINT","PROC
","READ","REM","REPEAT","RESTO
RE","RETURN","RUN","STOP","COL
OUR","TRACE","UNTIL","WIDTH","
OSCLI"
1622 DATA "SUM","BEAT"
1623 DATA "APPEND","AUTO","DEL
ETE","EDIT","HELP","LIST","LOA
D","LVAR","NEW","OLD","RENUMBE
R","SAVE"
1624 DATA "CASE","CIRCLE","FIL
L","ORIGIN","POINT","RECTANGLE
","SWAP","WHILE","WAIT","MOUSE
","QUIT","SYS",<9A>,<9B>,<9C>,
"ELLIPSE","BEATS","TEMPO","VOI
CES",<A1>,"STEREO"
1670 DEFPROCtwobyte
1680 byte%=BGET#src%,charcount
+=1:I%=byte%-&8E
1690 ENDPROC
1700 DEFPROCaddit
1710 FORJ%=0TOI%:READbas$:NEXT
:line$+=bas$
1720 ENDPROC
```

# Accent on Ample in a mega missive

**£10 Prize letter**

**Here's several points from Clive Jones, Sydenham Hill, London.**

*FOLLOWING the Ample series, I thought it might be helpful to provide a couple of utilities for the not-quite-a-beginner using this language.*

*Having learned the basics, most people begin to try out the supplied special effects like Echo. Here are a couple more which I find especially useful.*

*Firstly* ***Reverb****, which adds reverberation to a one voice tune. It is called by* n Reverb *where* n *is the number of voices to use in making the effect – two should be enough for slow tunes. Use* OFF Reverb *to cancel the effect. As with echo, you must assign instruments to each voice needed:*

```
"vce"[PNUM 10 DIM
ARRAY]
"max"[PNUM 10 DIM
ARRAY]
"Reverb"[
#11 max #! 0 vce #!
0 #> 30 AND ACT(
5 FVAR#? 0 #> IF(
  1 vce #+!
  vce #? #11 max #? #>
  IF( #2 1 1 vce #! )IF
  VOICE!
  )IF
  ACT
)ACT ]
```

*Secondly* ***Strum*** *called by* n Strum *gives a delay of* n *units to successive voices. Used with largish delays – 12 Strum – it will produce arpeggiation or with short delays – 2 Strum – it adds interest to parts played on guitars or similar sounds. The effect can be turned off with* OFF Strum*:*

```
"dly"[PNUM 10 DIM ARRAY]
"Strum"[
#11 dly #!
0 #> 30 AND ACT(
5 FVAR#? 0 #> IF(
  5 FVAR #? 1 #- dly #?
 #* DURATION
  ACT
  5 FVAR #? 1 #- dly #?
 #* -1#* DURATION
  )ELSE( ACT )IF
)ACT }
```

*Also, here is a considerably faster version of the ^; replacement word in your January issue:*

```
^; [ MVAL? 0,^;MVAL! / ]
```

*Note that the word uses the old version of ^; in its definition. This is perfectly allowable as long as the word is not redefined a second time, as the new one would try to use the first re-definition and probably give a* Too many levels *error when used.*

## Those lost chords

*I think Ian Waugh may have missed the point of A. Emery's February query concerning Ample 500. By* the original *start piece of the music Mr Emery was probably referring to the sequence of instructions which, by convention, is left in the text buffer when saving the final version of a piece so that a LOADRUN instruction will play it.*

*This sequence is, of course, erased if the EDIT command is typed. The only simple way to solve the problem is to make it into a word by adding:*

```
0."loader"[
255.]
```

*to it, followed by RUN. When you want it back, type "loader"EDIT and delete the first and last lines. This may not always work, especially if command-only words have been used.*

## File protector

*Many Basic program protection methods suffer from the same problem: The apparently secure listing can still be edited using EDIT on a Master. The only way that I have ever seen of preventing this is to carry out the following steps:*

```
LOAD "program name"
PRINT ~PAGE,~TOP
```

*Use these numbers in place of* pppp *and* tttt *below:*

```
!(TOP-2)=0
*SAVE "new program name"
 pppp tttt
```

*A* Bad program *error is given if it is loaded, listed, amended or inspected in any way, but it can still be RUN. CHAIN will not work, so you must use LOAD"name" followed by RUN. A !Boot file can easily be changed to run the protected program.*

## Drive decisions

*Concerning your advice to John Sparrow in the February issue about drive decisions, I have often used the following routine to generate a sideways ram version of the DFS on my Master which bypasses the* Read only *message.*

*This program has only been tested on DFS 2.24 and will probably crash on different versions. If the modified DFS is really useful it could be blown in to an eprom and inserted in socket eight:*

```
 10 REM Acorn DFS 2.24
 20 REM Converter CRJ
 30 DIM M%100
 40 FOR A%=0 TO 1:P%=M%
 50 [OPT A%*3
 60 LDA #&00:STA &70
 70 LDA #&80:STA &71
 80 LDA &F4:PHA:LDY #0
 90 .lp LDA &DBC:STA &F4
100 STA &FE30:LDA(&70),Y
110 STX &F4:STX &FE30
120 STA(&70),Y:INC &70
130 BNE loop:INC &71
140 LDA &71:CMP #&C0
150 BNE lp:LDA #&EA
160 STA &94D7:STA &94D8
170 PLA:STA&F4:STA &FE30
180 RTS:]:NEXT:*DISC
190 INPUT"Put new DFS i
n bank: "X%
200 CALLcode
210 OSCLI"UNPLUG "+STR$&
DBC
220 ?&FE4E=127:CALL!-4
```

*Note that to bring back the old DFS after using this utility, you should type *INSERT 9.*

## Tape timer

*Here's a fast and concise way to calculate the tape timings using – albeit rather cryptically – the fact that the volume of tape on a reel is the length of tape on it multiplied by the tape's cross-sectional area, coupled with a calculation of the volume of tape on the reel as being a cylinder of radius tape thickness times turns of tape.*

*Two constants* A *and* B *are found for each tape, which give the conversion from time to counter and vice-versa:*

```
 10REM Tape Timer
 20REM by CRJ
 30INPUT"Count 1, time
1 : "C1,T1
 40INPUT"Count 2, time
2 : "C2,T2
 50A=(T1/C1-T2/C2)/(C1-
C2)
 60B=T1/C1-A*C1
 70INPUT"Length of tape
 in mins: "M%
 8fLPRNT"Printout?(Y/
N)";
 90REPEATP%=INSTR("YyNn
",GET$)
100UNTILP%:PRINTMID$("Y
yNn",P%,1)
110IF P%<3 VDU2
120FOR T=0 TO M% STEP 5
130C=(SQR(B*B+4*A*T)-B)
/(2*A)
140PRINT"Counter:";INT(
C)TAB(20)"Time:";T
150NEXT:VDU3
```

*If you want to convert from counter readings to time, the formula to use is much simpler – T=A*C*C+B*C – after you have calculated* A *and* B *from two sample readings.*

## Bugged by IF

*Finally, if you want to see a really strange bug in Basic 4 in the Master try typing LIST ELSE and work out why this is accepted by the machine as LIST IF ELSE.*

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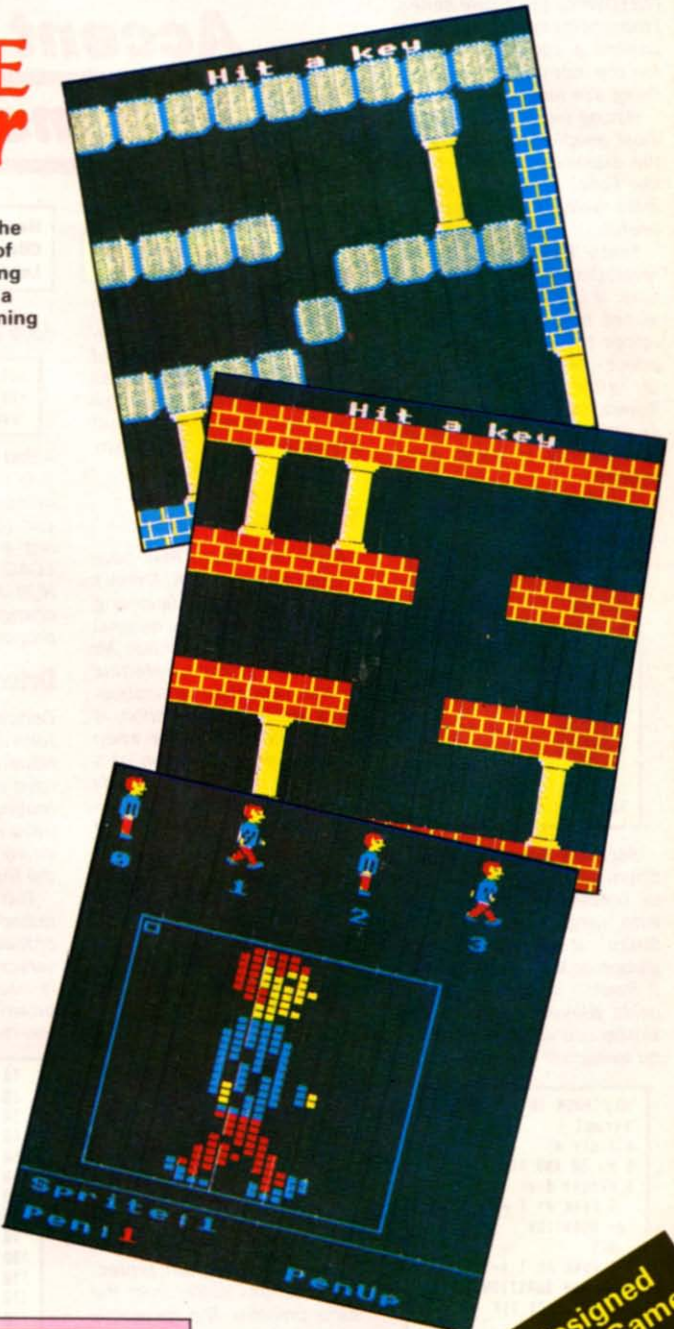

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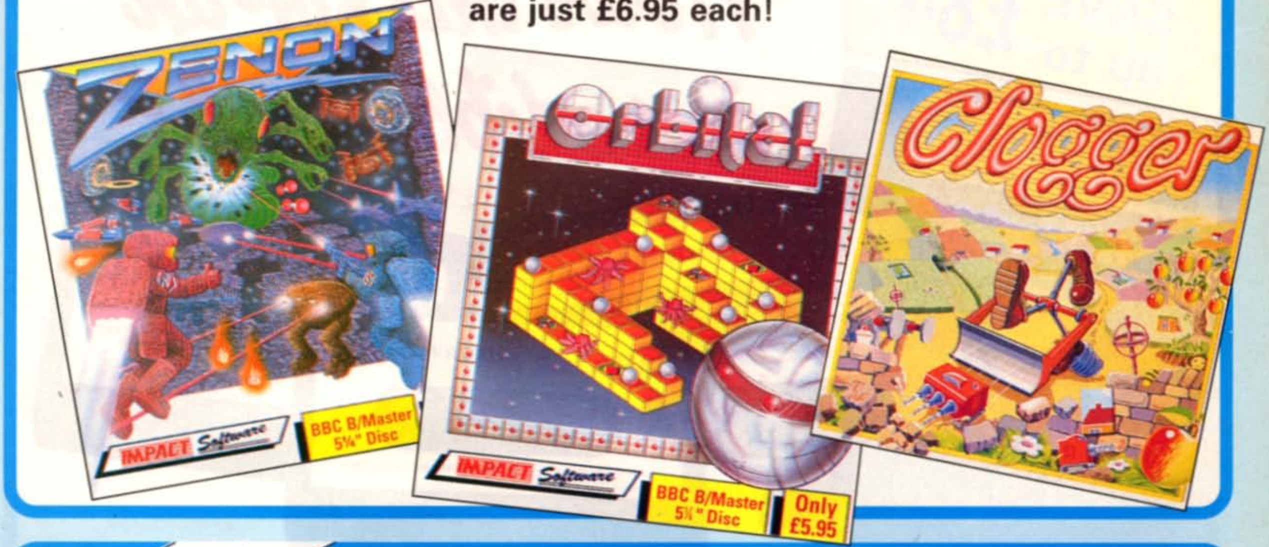

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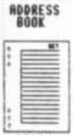

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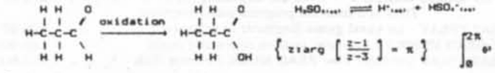

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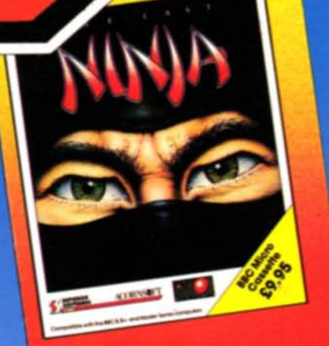
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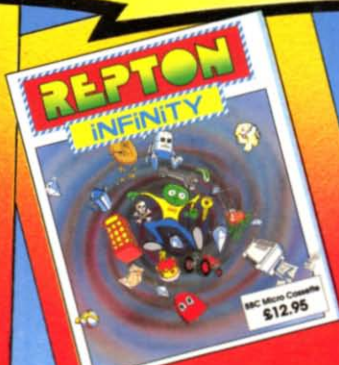
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